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ADVANCED BOILING WATER REACTOR

FEEDWATER LOOP A

PIPING AND EQUIPMENT LOADS

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1. INTRODUCTION

1.1 Purpose. The purpose of this Design Report is to show compliance with Article NB-3600 of the ASME Boiler and Pressure Vessel Code Section III (hereinafter referred to as ASME III) of the Feedwater Loop A piping configuration in the Advanced Boiling Water Reactor Power Plant.

1.2 Documentation

1.2.1 This document: (a) provides a summary of the most severe stress intensities throughout the piping system for the design and operating conditions defined in the Design Criteria and Analysis ~~Procedures~~ ^{Methods} Document (Reference 1); (b) shows that all pipe and fittings in the piping system satisfy the pressure design requirements of Article NB-3600 of ASME III for the conditions specified in the Design Specification; (c) summarizes the loads acting on the component supports, the vessel nozzle, feedwater penetration, and all pipe mounted equipment; and (d) compares the total loading on equipment to the allowable loads, where applicable. The detailed supporting computer output and calculations are contained in internal GE Design Record Files (DRF).

1.3 Scope. This Design Report covers only the Feedwater Loop A piping and the welds used for attaching this piping to the Reactor Pressure Vessel (RPV), pipe suspension, feedwater pipe penetration and pipe mounted equipment.

1.3.1 The feedwater piping consists of two loops designated as Loop A and Loop B. These two loops are symmetrical. Only Loop A was analyzed and therefore, only Loop A analysis results are presented in this Design Report.

2. SUMMARY

2.1 Model. The mathematical model of the piping system used in the analysis includes all of the feedwater loop piping, the feedwater valves and the suspension system for the piping system. All other lines such as sample lines and instrument lines are too small to affect the feedwater piping and were not included in the piping model.

2.2 Analysis. GE's proprietary computer program, PISYS, was used to calculate the response of the piping system to all of the static and dynamic loads defined in the Design Criteria and Analysis Methods Document. The output from the PISYS program was evaluated by another GE proprietary computer program, ANSI7, to solve the stress intensity equations of ASME III Subarticle NB-3650 and to calculate combined loads on all equipment mounted on or interfacing with the piping.

2.3 Results

2.3.1 ASME III Code Compliance. All of the piping satisfies the requirements of Article NB-3600 of ASME III. A summary of the results obtained by solution of the Subarticle NB-3650 equations for all significant joints in the piping system is contained in Appendix B.

2.3.2 Design Specification Compliance. This report documents compliance with allowable loads on equipment identified in the Design Criteria and Analysis Methods Document as shown in Appendices A through C of this report.

3. REQUIREMENTS AND BASIS

The input requirements used in the analysis are defined in the Design Criteria and Analysis Methods document, drawings and other documents referenced in this Design Report. These input documents are addressed in the paragraphs below.

3.1 Configuration

3.1.1 The configuration of the piping and suspension is defined by the feedwater piping and suspension drawings (References 2, 3 and 4). Snubber sizes greater than those specified in Reference 3 were used in the analysis. The snubber sizes used in the analysis are given in Appendix C1.

3.1.2 All data needed for modeling GE supplied pipe mounted equipment were obtained from equipment data sheets. These data sheets provide information such as weights, dimensions, center of gravity, and stiffness.

3.1.3 The properties of the materials used are shown in Tables 1 and 2, and the properties of the piping are shown in Table 3.

3.1.4 An isometric joint diagram and a list of the joint coordinates of the complete piping mathematical model are shown in Appendix E.

3.2 Loads. The Design Criteria and Analysis Methods Document contains a complete listing and description of all static and dynamic loads acting on the piping system. A complete listing of these loads is also contained in Table 5.

3.2.1 Static Loads and Pressure-Temperature Duty Cycles. The pressure, thermal, and dead weight loads acting on the piping system are defined in the Design Criteria and Analysis Methods Document. The definition of thermal expansion cases is presented in Table 4.

3.2.2 Dynamic Loads. Vibratory building loads acting on the piping system are caused by the response of the reactor building structure and reactor pressure vessel to dynamic loads. The analysis of the reactor building and pressure vessel is performed by Others and the results of this analysis provide amplified response spectra and maximum displacements at or near all points to which the pipe or pipe supports are attached to the structure. The input response spectra for applicable attachment points are specified in the Design Criteria and Analysis Methods Document.

3.3 Load Combinations. Many of the static and dynamic loads acting on the piping system act concurrently. The load combinations used for pipe, suspension, and pipe mounted equipment, and the acceptance criteria (allowable stress, allowable acceleration, allowable force or moment) for each combination are defined in the Design Criteria and Analysis Methods Document and presented in Appendix A.

4. METHODS

4.1 Equipment Modeling. The piping system is mathematically modeled to realistically reflect the static and dynamic reactions of the piping. The piping and equipment are represented in the model as a series of mass points (nodes) and interconnecting weightless springs. The mass points are generally selected so that their location coincides with the location of large masses. Mass points are spaced so that the elements between them will be of no greater length than a simple supported beam with uniformly distributed mass having a natural frequency equal to the cut-off frequency of the analysis.

4.1.1 Snubbers. Each snubber is modeled as a linear spring with an equivalent stiffness based on vendor supplied data.

4.1.2 Pipe Mounted Equipment. The mathematical models used for the valves are based on information supplied by the responsible GE Equipment Engineer. The model of all pipe mounted equipment is verified to realistically represent weight, stiffness, and dynamic properties of the equipment. The weight and center of gravity (CG) location of valve operators are considered in applicable valve models.

4.1.3 RPV Nozzles. The RPV nozzles are very stiff compared with the piping system and are therefore modeled as rigid anchors.

4.1.4 Spring Hangers. Variable spring hangers are modeled as upward forces in the dead weight analyses. Since their stiffness in comparison with snubbers and nozzles is very small, spring hangers are not included in any of the analyses for dynamic loads.

4.1.5 Anchors. Other than the RPV nozzles, the only anchor in the piping system is at the containment penetration. This penetration anchor is modeled as boundary elements with stiffnesses equivalent to rigid.

4.1.6 Guide. The guide near the feedwater valves is modeled as a boundary element with both translational and rotational stiffnesses.

4.2 Dynamic Analysis. The dynamic analysis was performed using two methods. The inertia effects of each of the governing dynamic loads are evaluated using the Multiple Support Response Spectra Analytical Method, also known as Independent Support Motion (ISM) Method. Since the piping system is supported at several points and the excitation at each point is different, the ISM permits applying different excitation at each of the separate points, thereby eliminating the conservatism of Enveloped Response Spectra Method, also known as Uniform Support Motion (USM) Method. The inertia effects of the non-governing loads are evaluated using the Enveloped Response Spectra Method.

The dynamic loads are listed in Table 5. Earthquake, Annular Pressurization and Condensation Oscillation were analyzed using the Multiple Support Response Spectra method. Chugging and safety relief valve basemat acceleration for all valves were analyzed using the Enveloped Response Spectra method.

4.2.1 Some other important dynamic criteria used in the analysis are tabulated below:

<u>ITEM</u>	<u>CRITERIA</u>
Damping: Seismic OBE/SSE Dynamic Loads	Reg. Guide 1.61 Reg. Guide 1.61
Cutoff Frequencies Acceleration Response Spectra (ARS)	Seismic - 33 Hz Other dynamic loads - 60 Hz
Combination of 3 Direction Components	Square Root of the Sum of the Squares (SRSS)
Combination of Primary and Secondary Loads and Stresses	SRSS
Response Spectrum Peak Broadening	Plus or minus 10 %
Modal Combination	Double Sum Method which accounts for effects of any closely spaced modes per Reg. Guide 1.92.

4.3 Thermal Analysis. Thermal gradients are conservatively calculated using the ANSI7 computer program by assuming an infinite heat transfer film coefficient with a linear process fluid temperature change equal to the step change defined for the load set. The radial gradients are computed idealizing the pipe wall as a flat plate. Longitudinal gradients are computed by separately analyzing two sections and selecting the greatest temperature difference that occurs during the transient.

4.4 Computer Programs. The computer programs used in the piping stress analysis are described below. All of these programs were written by and meet the Quality Control Standards of GE. All programs have been approved for production use after independent review and verification. Any changes to these programs required verification and approval in accordance with the NRC approved GE Quality Assurance Program.

4.4.1 PISYS. PISYS performs static and dynamic analysis of piping systems. The analysis modules of PISYS were derived directly from the SAP4G program.

4.4.2 ANSI7. The ANSI7 program calculates stresses and cumulative usage factors for Class 1, 2 and 3 piping components in accordance with Article NB-3600 and Subarticle NC-3652 of ASME III. This program also calculates combined loads on piping equipment in accordance with the equipment load combinations given in the piping Design Criteria and Analysis Methods Document and compares them with the allowable loads where applicable.

5. RESULTS

5.1 Design for Pressure (NB-3640)

5.1.1 Straight Pipe and Pipe Bends. Membrane protection for these items is provided by meeting the minimum wall requirements of Paragraphs NB-3641 and NB-3642 of ASME III. The comparison of minimum wall calculations with the values specified on the piping Drawing (Reference 2) are contained in Table 3.

5.1.2 Elbows. Long radius elbows are manufactured in accordance with ANSI B16.9 Standard. The minimum wall requirements for long radius elbows are the same as for straight pipe; therefore, the minimum wall thickness tabulated in Table 3 for straight pipe applies to elbows.

5.2 Structural Analysis. The forces, moments and deflections of the pipe at each joint in the piping system identified on the stress analysis diagram for the thermal, dead weight and dynamic loading are calculated. The summary of calculated data for applicable load combinations by service level is presented in Appendix B.

5.3 Piping Component Analysis

5.3.1 ASME Code Evaluation. The piping components were analyzed in accordance with the requirements of ASME III, Subarticle NB-3650 by the ANSI7 computer program. The analysis showed that all of the requirements of Subarticle NB-3650 of ASME III have been met.

5.3.2 Summary of Analytical Evaluation. A summary of the analytical evaluation of the piping components is given in Appendix B. The summary consists of stresses, usage factors, and ratios to allowable.

5.4 Piping System Equipment Loads, Appendices A through C. The loads acting on equipment and supports interfacing with the piping are presented in Appendices A through C of this report. Appendix A provides the load combinations, Appendix B contains a summary of results, and Appendix C provides the detailed interface loads for the following equipment.

5.4.1 Reactor Pressure Vessel (RPV) Nozzles. These appendices present calculated forces and moments on the Reactor Pressure Vessel nozzles.

5.4.2 Valve Equipment. These appendices give interface information for the valve equipment components. The center of gravity (CG) accelerations are compared with their allowables.

5.4.3 Suspension and Structural Attachments. These appendices give the loading criteria and calculated loads for the piping suspension. This includes snubbers, guides, and penetrations. The location of, and coordinates for the suspension are given in Appendix E. The calculated loads for each support component are compared with their allowable loads for all service levels.

5.5 Thermal Displacements, Appendix D. Appendix D presents the thermal displacements for the normal operating condition for all significant nodes in the piping system.

6. REFERENCES

1. GE, "ABWR Main Steam, Feedwater and SRVDL Piping Systems Design Criteria and Analysis Methods", GE Document No. NEDC-XXXX.
2. GE, "Feedwater Loop Piping", K7, Drawing No. 103E1188.
3. GE, "Feedwater Piping Suspension", K7, Drawing No. 103E1437.
4. GE, "Feedwater and Main Steam Penetrations", K7, Drawing No. 103E1422.

TABLE 1 PROPERTIES OF MATERIALS

Material	Material Type	Temperature (*F)	S _m (psi)	S _y (psi)	Modulus of Elasticity (psi)
ASME SA-333 Gr. 6 Carbon Steel Piping	1	421 (3)	19800	29600	29.5E6 (1)
		575 (4)	17700	26500	27.6E6 (2)
ASME SA-420	2	421 (3)	19800	29600	29.5E6 (1)
		575 (4)	17700	26500	27.6E6 (2)

- (1) E_c = Modulus of Elasticity at 70°F
 (2) E_h = Modulus of Elasticity at 421°F
 (3) Piping (Reactor) Operating Temperature
 (4) Piping Design Temperature

TABLE 2 MATERIAL ALLOWABLES

Material Type	Level Lesser of the	Design 1.5 S _m	Level B 1.8 S _m 1.5 S _y	Level C 2.25 S _m 1.8 S _y	Level D 3.0 S _m 2.0 S _y	Eq. 12 #13 3.0 S _m
1 and 2	Allow psi	26550	31860	39825	53100	53100

TABLE 3 PIPING DIMENSIONAL PROPERTIES

	Feedwater Loop A	
Nom. Pipe Size (in)	12	22
Nom. Pipe OD (in)	12.539	22.0
Nom. Pipe ID (in)	10.853	19.25
Min Wall t_{mc} (2)	0.530	0.840
Nom. Wall t_{nom} (in)	0.843	1.375
Material Type (1)	1	1
Weight (lb/ft) (3)	157.9	453.9

Notes: (1) Refer to Table 1
 (2) Minimum Wall Requirements Calculated per ASME III, Section NB-3640
 (3) Weight equals pipe weight plus water weight plus insulation weight

TABLE 4 DEFINITION OF THERMAL EXPANSION CASES*

	Temperature (degrees F)			
	Case 1	Case 2	Case 3	Case 4
Feedwater Piping	421	50	200	300
RPV Upper Section A	552	552	552	552
RPV Upper Section B	528	528	528	528
RPV Skirt Section D	247	247	247	246

Case 1 is normal operating conditions.

Case 2 is loss of feedwater conditions.

Case 3 is normal operating conditions with low feedwater flow.

Case 4 is intermediate feedwater temperature conditions.

*These thermal cases envelope all thermal conditions shown in Pressure/Temperature Cycles referenced in the Design Criteria and Analysis Methods Document.

TABLE 5 NOMENCLATURE OF LOADS

Load Type	Case	Ident	Dir***	Description
		PO		Operating Pressure
		PD		Design Pressure
		PP		Peak Pressure
Thermal	1	TE1		Normal Operating Condition
Thermal	2	TE2		Loss of Feedwater
Thermal	3	TE3		Normal Operating with Low Feedwater Flow
Thermal	4	TE4		Intermediate Feedwater Temperature Conditions
Thermal		TEMAX		Greatest of Thermal 1, 2, 3, or 4
Weight	1	WT1		Dead Weight
Seismic	1	OBEI	X	Operating Basis Earthquake - Inertia Effect
Seismic	2	"	Y	Operating Basis Earthquake - Inertia Effect
Seismic	3	"	Z	Operating Basis Earthquake - Inertia Effect
OBE D	1	OBED*	X	Operating Basis Earthquake - Anchor Displacement
OBE D	2	OBED*	Z	Operating Basis Earthquake - Anchor Displacement
SSEI	1	SSEI	X	Safe Shutdown Earthquake - Inertia Effect
SSEI	2	SSEI	Y	Safe Shutdown Earthquake - Inertia Effect
SSFI	3	SSEI	Z	Safe Shutdown Earthquake - Inertia Effect
SSD	1	SSD*	X	Safe Shutdown Earthquake - Anchor Displacement
SSD	2	SSD*	Z	Safe Shutdown Earthquake - Anchor Displacement
A.P.I.	1,7	API**	HOR	Annulus Pressurization Inertia Effect - Postulated Recirculation Break
A.P.I.	2,8	API**	HOR	Annulus Pressurization Inertia Effect - Postulated Feedwater Break
A.P.I.	3,9	API**	HOR	Annulus Pressurization Inertia Effect - Postulated Main Steam Break
A.P.D.	1,7	APD		Annulus Pressurization Anchor Displacement, Maximum of Recirculation, Feedwater and Main Steam Pipe Break.
STRAT N	1	STRAT N		Thermal stratification in the piping at the RPV nozzle
STRAT H	1	STRAT H		Thermal stratification in the feedwater header piping

TABLE 5 NOMENCLATURE OF LOADS (Continued)

Load Type	Case	Ident	Dir***	Description
CHUG. I	1,3	CHUGI	HOR	Chugging Load - Inertia Effect
CHUG. I	2	CHUGI	Y	Chugging Load - Inertia Effect
COND. I	2	CONDI	Y	Condensation Oscillation - Inertia Effect
RV2 SVII	1,3		X,Z	Single Safety Relief Valve - Inertia Effect
RV2 SVII	2		Y	Single Safety Relief Valve - Inertia Effect
RV2 I	1,3	RV2 I	X,Z	All Safety Relief Valves Basemat Acceleration - Inertia Effect
RV2 I	2	RV2 I	Y	All Safety Relief Valves Basemat Acceleration - Inertia Effect

* OBED cases 1 and 2 were combined using the SRSS method.

SSED cases 1 and 2 were combined using the SRSS method.

** For API, the higher of the Recirculation, Feedwater, or Main Steam Breaks is used.

*** The X-direction is east/west, the Z-direction is north/south, and Y is vertical.

TABLE 6 NOMENCLATURE FOR APPENDICES

AAH	=	Allowable horizontal acceleration (g)
AAV	=	Allowable vertical acceleration (g)
AH	=	Calculated horizontal acceleration (g)
ALLOW	=	Allowable force (lb) or moment (in-lb)
ANC	=	Anchor identification in structural analysis
AV	=	Calculated vertical acceleration (g)
AX, AY, AZ	=	Acceleration in X, Y, Z directions (lb)
COMB	=	Service level equation number as shown on load combination table
FA, FB, FC*	=	Local force in A, B, C directions (lb)
F/M	=	Force (lb) and moment (in-lb)
FX, FY, FZ	=	Global force in X, Y, Z directions (lb)
GGD	=	Global guide identification in structural analysis
GUD	=	Guide identification in structural analysis
LOAD	=	Calculated load (lb)
MA, MB, MC*	=	Local moment in A, B, C directions (in-lb)
MX, MY, MZ	=	Global moment in X, Y, Z directions (in-lb)
NELM	=	Guide or anchor identification in structural analysis
RATIO	=	Calculated load or stress divided by allowable load or stress
SNB	=	Snubber identification in structural analysis

*There are two types of elements that the PISYS computer program uses to form the pipe model. One is the straight or tangent element and the other is a planar bend element. Each element has local coordinate axes that orient the element in the global coordinate system and identify force and moment components at a joint with respect to element axes. Moreover, joint displacement and rotation require a knowledge of the local axes. The convention for the orientation of these local axes is as follows:

- (1) Tangent elements parallel to the global Y-axis (vertical axis) have their local B-axis diverted to and in the same direction as the global Z-axis.
- (2) Tangent elements not parallel to the global Y-axis have their local B-axis contained in a vertical (global) plane such that local B-axis projects positively on the positive global Y-axis.
- (3) For bend elements, the local B-axis is directed positively toward and intersects the center of curvature of the bend (i.e., radius vector).
- (4) The local A-axis is tangent to the arc of the bend or straight element and is directed positively from the FROM joint to the TO joint.

TABLE A1 LOAD COMBINATIONS - CLASS 1 PIPING

ABWR K7

22 INCH FEEDWATER PIPE

THE LOADING COMBINATION USED FOR THE ANALYSIS ** 1*** ARE AS FOLLOW

DESIGN 1	PD + WT1				
LEVL B 1	PP + WT1	+	SQRT((DBE1)**2	+	(RV21)**2)
LEVL C 1	PP + WT1	+	SQRT((CHUG1)**2	+	(RV21)**2)
LEVL D 1	PP + WT1	+	SQRT((SSE1)**2	+	(CHUG1)**2 + (RV21)**2)
LEVL D 2	PP + WT1	+	SQRT((SSE1)**2	+	((CHUG1)**2 + (RV21)**2)
LEVL D 3	PP + WT1	+	SQRT((SSE1)**2	+	(A1)**2)

NOTE ALL UNITS ARE IN POUNDS, INCHES EXCEPT NOTED

NOTE IF NO USER INPUT PRESSURE FOR EACH LOAD COMBINATION, PEAK PRESSURE WILL BE USED FOR LEVEL B, C AND D

TABLE A2 LOAD COMBINATIONS FOR SNUBBERS

ABWR K7 FEEDWATER A

LOADING COMBINATION FOR **SNB ** ARE AS FOLLOW

LEVL B 1	SQRT((OBE1)**2	+ (OBED)**2	+ (RV21)**2)
LEVL C 1	SQRT((CHUG1)**2	+ (RV21)**2)	
LEVL D 1	SQRT((SSE1)**2	+ (SSED)**2	+ (CHUG1)**2	+ (RV21)**2)
LEVL D 2	SQRT((SSE1)**2	+ (SSED)**2	+ (COND1)**2	+ (RV21)**2)
LEVL D 3	SQRT((SSE1)**2	+ (SSED)**2	+ (API)**2	+ (APD)**2)

TABLE A3 LOAD COMBINATIONS - RPN NOZZLES

ABWR K7

22 INCH FEEDWATER PIPE

THE LOADING COMBINATION USED FOR THE ANALYSIS ** 1*** ARE AS FOLLO

DESIGN 1	PD + WT1	+	SQRT((OBEI)**2	+	(RV21)**2)
LEVEL C 1	PP + WT1	+	SQRT((CHUG1)**2	+	(RV21)**2)
LEVEL D 1	PP + WT1	+	SQRT((SSEI)**2	+	(CHUG1)**2 + (RV21)**2)
LEVEL D 2	PP + WT1	+	SQRT((SSEI)**2	+	(CONDI)**2 + (RV21)**2)
LEVEL D 3	PP + WT1	+	SQRT((SSEI)**2	+	(API)**2)

NOTE ALL UNITS ARE IN POUNDS, INCHES EXCEPT NOTED

NOTE IF NO USER INPUT PRESSURE FOR EACH LOAD COMBINATION, PEAK PRESSURE WILL BE USED FOR LEVEL B, C AND D

PRIMARY + SECONDARY

PP + WT1 + TEMAX + STRAH

LEVEL B

PP + WT1 + TEMAX + STRAN

PP + WT1 + TEMAX + SQRT((OBEI)**2 + (OBEI)**2 + (RV21)**2)

SQRT((OBEI + OBEI)**2 + (OBEI + OBEI)**2 + (RV21 + RV21)**2)

TABLE A4 LOAD COMBINATIONS FOR VALVE ACCELERATION

ABWR K7 FEEDWATER A

LOADING COMBINATION FOR **VACC ** ARE AS FOLLOW

LEVEL B 1	SQRT((OBE1)**2	+ (RV21)**2)
LEVEL C 1	SQRT((CHUG1)**2	+ (RV21)**2)
LEVEL D 1	SQRT((SSE1)**2	+ (CHUG1)**2	+ (RV21)**2)
LEVEL D 2	SQRT((SSE1)**2	+ (CONDI)**2	+ (RV21)**2)
LEVEL D 3	SQRT((SSE1)**2	+ (API)**2)

TABLE A5 LOAD COMBINATIONS FOR GUIDES

ABWR K7 FEEDWATER A

LOADING COMBINATION FOR **GGD ** ARE AS FOLLOW

LEVEL A 1	WT1	+ TEMAX	+ STRAH	+ (DBED)**2	+ (RV21)**2	
LEVEL A 2	WT1	+ TEMAX	+ STRAN			
LEVEL B 1	WT1	+ TEMAX	+ SORT((DBEI)**2	+ (RV21)**2		
LEVEL C 1	WT1	+ TEMAX	+ SORT((CHUGI)**2			
LEVEL D 1	WT1	+ TEMAX	+ SORT((SSEI)**2	+ (CHUGI)**2	+ (RV21)**2	+ (SSEI)AK2)
LEVEL D 2	WT1	+ TEMAX	+ SORT((SSEI)**2	+ (CONDI)**2	+ (RV21)**2	+ (SSEI)AK2)
LEVEL D 3	WT1	+ TEMAX	+ SORT((SSEI)**2	+ (API)**2	+ (SSEI)AK2 + (API)AK2)	

ABWR K7 FEEDWATER A

LOADING COMBINATION FOR **FLGM ** ARE AS FOLLOW

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TABLE B11 PIPING STRESSES (HIGHEST TO LOWEST STRESS)

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7

22 INCH FEEDWATER PIPE

PART 2

DESIGN	EQ 9 *	LEVEL B	EQ 9 *	LEVEL C	EQ 9 *	LEVEL D	EQ 9 *	SECONDARY EQ 12 *	PRI+SEC-T EQ 13 *	FATIGUE EQ 14								
NO	R *	NO	S	NO	S	NO	S	R *	S	USAGE								
031	10050	0.38	024	22770	0.71	031	15617	0.39	024	36648	0.69	031	27659	0.52	031	37864	0.71	0.57
009	7785	0.29	031	20273	0.64	024	13823	0.35	031	28445	0.54	024	19518	0.37	024	33170	0.62	0.54
029	7743	0.29	009	17282	0.54	009	11960	0.30	009	25959	0.49	034	16014	0.30	034	31986	0.60	0.43
008	7185	0.27	008	15989	0.50	008	11035	0.28	008	23925	0.45	023	11934	0.22	008	24130	0.45	0.16
012	7054	0.27	012	14466	0.45	012	10464	0.26	018	21302	0.40	021	11535	0.22	009	23957	0.45	0.09
031	6845	0.26	024	13672	0.43	034	10461	0.26	012	21034	0.40	016	11107	0.21	012	23935	0.45	0.21
031	6821	0.26	005	12033	0.38	029	9625	0.24	034	19551	0.37	018	10770	0.20	005	22134	0.42	0.09
024	6389	0.24	018	11887	0.37	005	8718	0.22	005	17291	0.33	015	4994	0.09	015	21501	0.40	0.05
019	6172	0.23	029	11226	0.35	025	8683	0.22	004	15601	0.29	012	3703	0.07	003	21417	0.40	0.04
025	6017	0.23	004	11080	0.35	031	8485	0.21	023	14980	0.28	024	3277	0.06	031	20294	0.38	0.05
005	5845	0.22	025	11034	0.35	031	8418	0.21	025	14882	0.28	008	3035	0.06	031	20270	0.38	0.05
004	5663	0.21	019	10758	0.34	019	8351	0.21	019	14467	0.27	019	2774	0.05	024	18833	0.35	0.27
034	5545	0.21	003	10307	0.32	004	8245	0.21	003	14324	0.27	009	2236	0.04	024	18729	0.35	0.32
032	5537	0.21	031	9610	0.30	003	7796	0.20	021	13961	0.26	031	2191	0.04	034	18530	0.35	0.36
015	5420	0.20	031	9599	0.30	024	7264	0.18	029	13883	0.26	005	2128	0.04	034	18524	0.35	0.35
024	5384	0.20	024	9271	0.29	024	7155	0.18	024	12401	0.23	029	1939	0.04	021	15652	0.29	0.09
003	5364	0.20	024	8943	0.28	032	6830	0.17	024	11792	0.22	025	1865	0.04	018	14952	0.28	0.24
027	5305	0.20	021	8668	0.27	015	6739	0.17	031	11663	0.22	024	1856	0.03	029	14308	0.27	0.31
024	5280	0.20	023	8431	0.26	027	6654	0.17	031	11647	0.22	034	1843	0.03	023	14087	0.27	0.24
034	5081	0.19	032	7704	0.24	034	6318	0.16	016	11629	0.22	003	1807	0.03	016	13801	0.26	0.34
034	5075	0.19	027	7409	0.23	034	5593	0.14	032	9312	0.18	004	1293	0.02	019	12737	0.24	0.31
035	5014	0.19	015	7279	0.23	035	5438	0.14	027	8826	0.17	027	1187	0.02	025	12582	0.24	0.34
036	5000	0.19	034	6949	0.22	036	5400	0.14	015	8356	0.16	031	986	0.02	004	12228	0.23	0.03
021	2900	0.11	016	6721	0.21	021	5238	0.13	034	8101	0.15	032	781	0.01	032	12102	0.23	0.15
018	2431	0.09	034	5676	0.18	018	5123	0.13	034	5850	0.11	034	0	0.00	027	11870	0.22	0.08
023	1851	0.07	035	5454	0.17	023	3591	0.09	035	5489	0.10	035	0	0.00	035	11579	0.22	0.12
016	1659	0.06	036	5400	0.17	016	3116	0.08	036	5400	0.10	036	0	0.00	036	11565	0.22	0.05

TABLE B.1.2 PIPING STRESSES (HIGHEST TO LOWEST STRESS)

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7

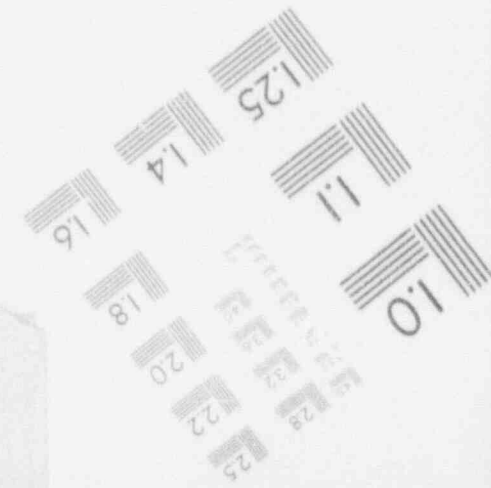
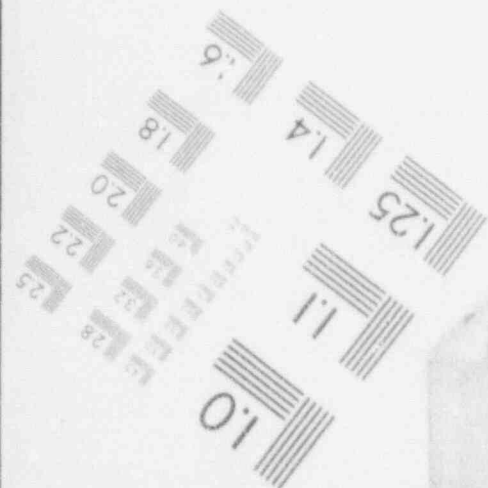
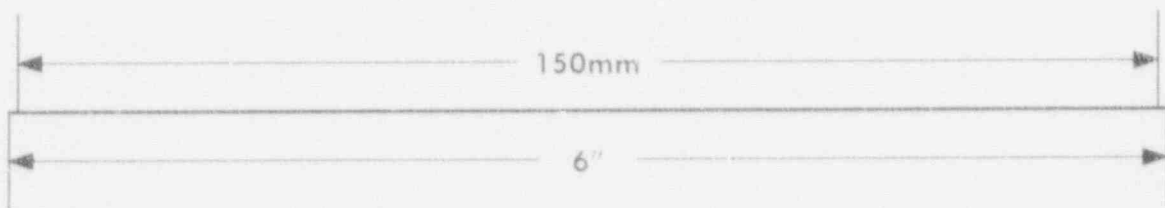
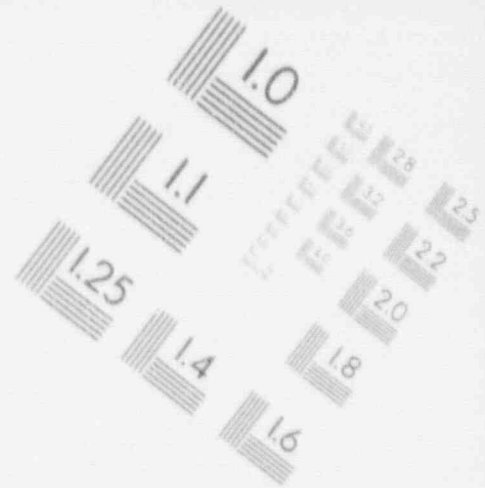
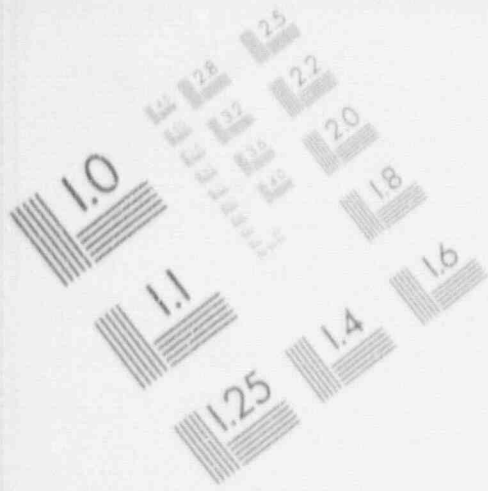
12 INCH RISER PIPE

PART 2

DESIGN	EQ 9	S	R *	LEVEL B	EQ 9	S	R *	LEVEL C	EQ 9	S	R *	LEVEL D	EQ 9	S	R *	NO	SECONDARY EQ 12	M *	NO	PRI+SEC-T EQ 13	R *	FATIGUE EQ 14	USAGE
093	6686	0.25	082	17930	0.56	082	12152	0.31	082	29071	0.55	059	34461	0.65	093	24591	0.46	072	0.23				
054	6627	0.25	080	17545	0.55	093	12007	0.30	080	28345	0.53	071	32248	0.61	054	24502	0.46	093	0.27				
094	6321	0.24	093	16380	0.51	080	11946	0.33	043	27250	0.51	069	29540	0.56	094	24218	0.46	054	0.24				
055	6294	0.24	043	16220	0.51	054	10667	0.27	041	26571	0.50	061	29112	0.55	055	24170	0.46	073	0.24				
072	6071	0.23	041	15915	0.50	094	10649	0.27	092	26507	0.50	038	27364	0.52	072	23657	0.45	094	0.24				
073	5806	0.22	054	15523	0.49	043	9692	0.24	053	26178	0.49	067	25499	0.48	073	23309	0.44	055	0.23				
037	5108	0.19	092	15064	0.47	041	9634	0.24	093	24064	0.45	053	25347	0.48	092	21828	0.41	074	0.7				
076	5057	0.19	053	14746	0.46	055	9549	0.24	051	23665	0.45	077	25276	0.48	088	21455	0.40	095	0.17				
058	5049	0.19	094	13704	0.43	072	8586	0.22	090	29528	0.44	040	24717	0.47	095	21437	0.40	056	0.16				
082	3279	0.12	051	13246	0.42	037	8144	0.20	038	23289	0.44	051	23274	0.44	056	21430	0.40	071	0.16				
080	3263	0.12	090	13237	0.42	076	8091	0.20	054	23136	0.44	079	22337	0.42	090	21365	0.40	069	0.14				
043	3148	0.12	038	13235	0.42	073	7962	0.20	045	20974	0.39	058	21656	0.41	053	21323	0.40	067	0.12				
041	3137	0.12	055	12985	0.41	058	7525	0.19	088	20622	0.39	065	21121	0.40	074	21286	0.40	053	0.12				
092	2056	0.08	049	12051	0.38	092	7521	0.19	040	20016	0.38	049	19878	0.37	049	21082	0.40	058	0.11				
046	1964	0.07	088	11870	0.37	053	7094	0.18	094	19341	0.36	072	19619	0.37	071	21037	0.40	092	0.11				
095	1948	0.07	049	11650	0.37	038	6802	0.17	077	19322	0.36	083	19109	0.36	051	20792	0.39	051	0.10				
056	1944	0.07	037	11489	0.36	090	6478	0.16	055	18577	0.35	092	18806	0.35	069	20365	0.38	049	0.09				
061	1943	0.07	077	11251	0.35	051	6436	0.16	047	17621	0.33	054	18071	0.34	067	20203	0.38	076	0.08				
085	1926	0.07	072	11030	0.35	049	6417	0.16	059	17454	0.33	044	17308	0.33	037	19154	0.36	088	0.08				
086	1885	0.07	076	10586	0.33	040	6417	0.16	086	17442	0.33	073	15939	0.30	076	19061	0.36	090	0.08				
079	1883	0.07	059	10434	0.33	059	6413	0.16	079	17076	0.32	093	15924	0.30	058	19047	0.36	037	0.07				
062	1865	0.07	047	10398	0.33	061	6374	0.16	037	16719	0.31	037	15905	0.30	082	16182	0.30	059	0.05				
040	1855	0.07	086	10362	0.33	088	6322	0.16	061	16663	0.31	053	15887	0.30	080	16158	0.30	077	0.04				
074	1847	0.07	061	10072	0.32	077	6294	0.16	072	15340	0.29	047	15540	0.29	043	15986	0.30	061	0.04				
088	1806	0.07	079	10067	0.32	085	6114	0.15	076	14810	0.28	030	15208	0.29	041	15970	0.30	065	0.03				
059	1774	0.07	073	9742	0.31	047	5989	0.15	044	14198	0.27	076	15059	0.28	046	14219	0.27	079	0.03				
090	1746	0.07	058	9437	0.30	085	5821	0.15	083	13910	0.26	085	14305	0.27	061	14188	0.27	038	0.03				
053	1718	0.06	044	8251	0.26	079	5780	0.15	071	13334	0.25	094	13969	0.26	085	14162	0.27	083	0.02				
038	1712	0.06	083	8179	0.26	046	4766	0.12	073	13029	0.25	062	12559	0.24	086	14102	0.27	040	0.02				
047	1707	0.06	085	8031	0.25	083	4754	0.12	058	12733	0.24	064	11365	0.21	079	14099	0.27	047	0.02				
077	1680	0.06	071	7594	0.24	044	4452	0.11	085	12406	0.23	088	11194	0.21	062	14071	0.26	085	0.02				
049	1556	0.06	046	7335	0.23	052	3661	0.09	069	11926	0.22	046	10401	0.20	040	14057	0.26	062	0.02				
071	1525	0.06	069	6655	0.21	071	3409	0.09	046	11712	0.22	086	7916	0.15	059	13936	0.26	064	0.02				
064	1391	0.05	062	6041	0.19	069	2884	0.07	067	10167	0.19	082	4541	0.09	038	13843	0.26	044	0.02				

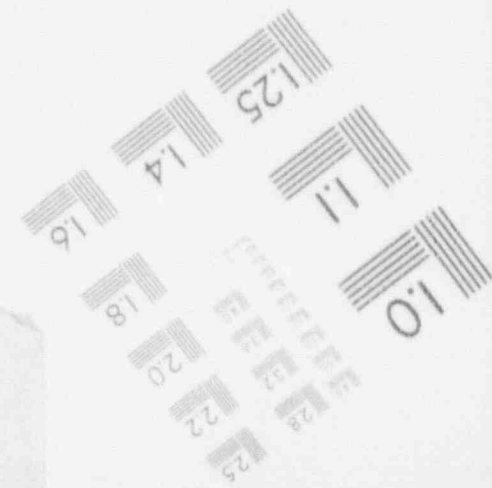
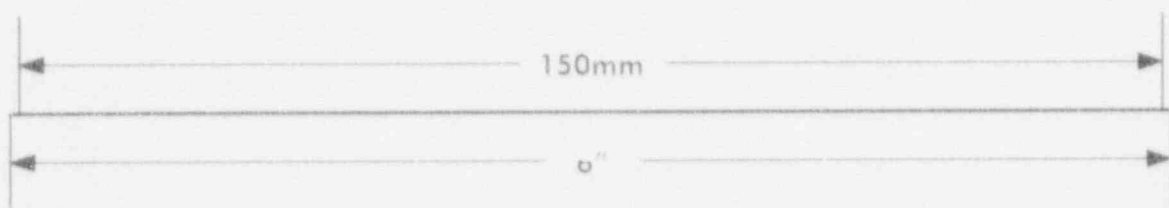
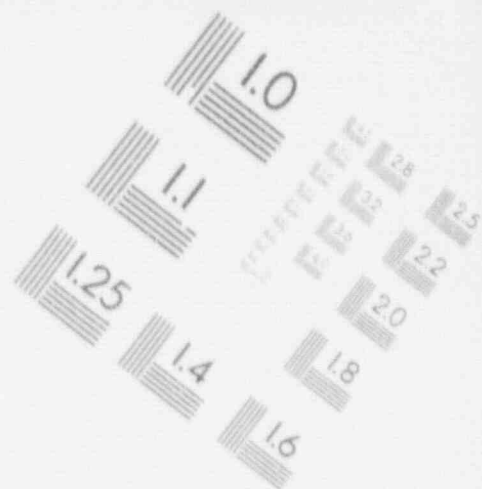
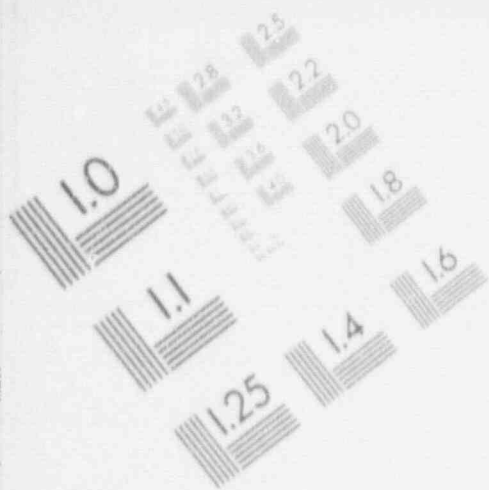
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IMAGE EVALUATION TEST TARGET (MT-3)



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IMAGE EVALUATION TEST TARGET (MT-3)



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IMAGE EVALUATION TEST TARGET (MT-3)

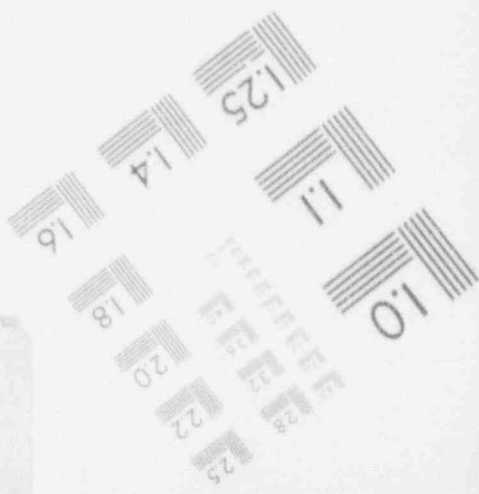
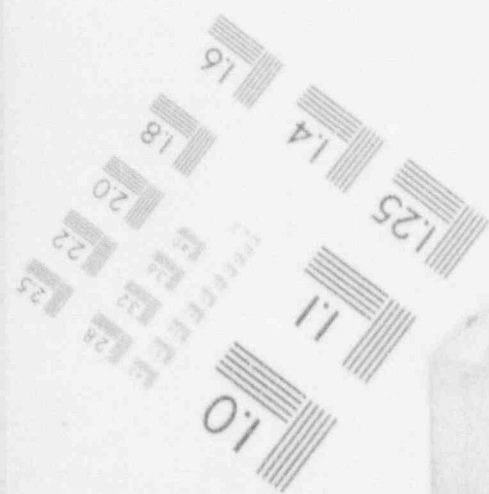
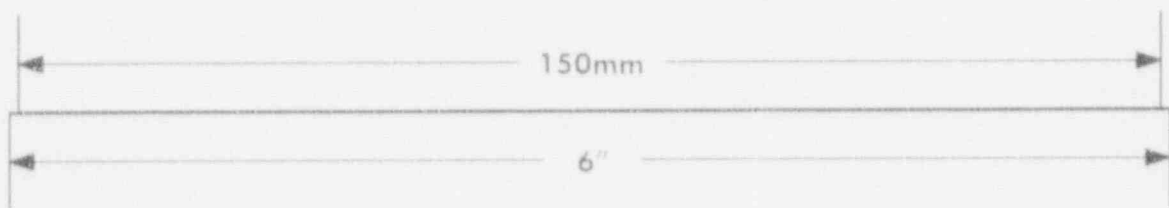
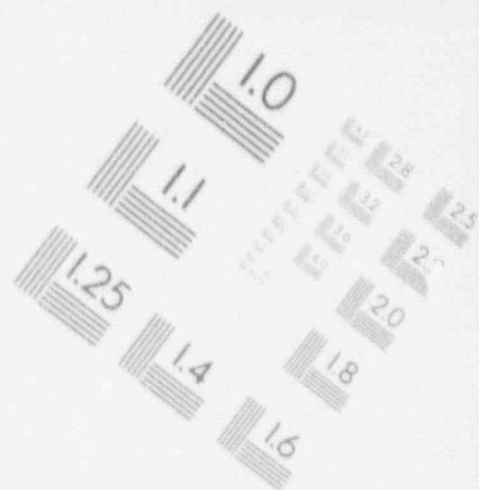
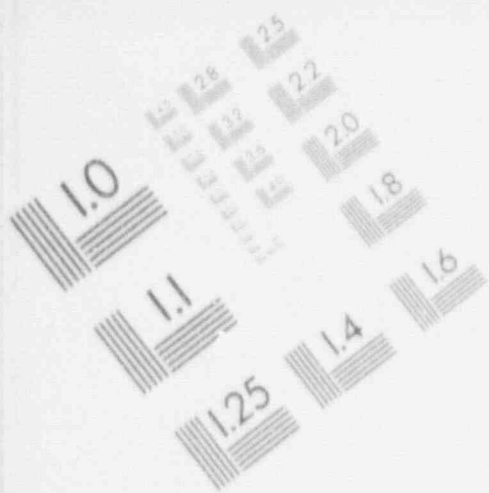


TABLE B1.2 (CONTINUED)

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7

12 INCH RISER PIPE

PART 2

DESIGN	EQ 9 S	R *	LEVEL B	EQ 9 S	R *	LEVEL C	EQ 9 S	R *	LEVEL D	EQ 9 S	R *	SECONDARY EQ 12 S	R *	PRIMARY EQ 17 S	R *	FATIGUE EQ 14 USAGE			
051	1362	0.05	067	5717	0.18	095	2848	0.07	062	9929	0.19	043	4233	0.08	047	13836	0.26	082	0.02
044	1312	0.05	065	4865	0.15	064	2691	0.07	065	8384	0.16	041	3849	0.07	077	13795	0.26	086	0.02
083	1266	0.05	064	4413	0.14	067	2658	0.07	064	7222	0.14	080	3677	0.07	065	13364	0.25	080	0.02
065	1107	0.04	095	3423	0.11	056	2634	0.07	095	4496	0.08	056	2578	0.05	044	13246	0.25	043	0.02
069	1076	0.04	056	3282	0.10	065	2562	0.06	056	4347	0.08	074	2530	0.05	083	13178	0.25	041	0.01
067	968	0.04	074	2665	0.08	074	2327	0.06	074	3298	0.06	095	2262	0.04	065	12944	0.24	046	0.01

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

TABLE B2 SNUBBER LOADS SUMMARY

ABWR K7 FEEDWATER A

SNB	LEVEL B			LEVEL C			LEVEL D			
	LOAD	RATIO	COMB	LOAD	RATIO	COMB	LOAD	RATIO	COMB	
AS003	019.	37031.	0.570	1	9293.	0.107	1	72922.	0.748	3
AS004	025.	40262.	1.619	1	20939.	0.242	1	72686.	0.745	2
AS005	025.	19747.	0.494	1	8528.	0.160	1	37492.	0.625	3
AS006	032.	17790.	0.445	1	8713.	0.163	1	33367.	0.556	2
AS007	027.	19800.	0.495	1	12605.	0.236	1	34091.	0.568	2

TABLE B3 POV NOZZLE LOADS & STRESSES

— LATER —

TABLE B4 VALVE ACCELERATION SUMMARY

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A

	LEVEL B		LEVEL C		LEVEL D	
	ACCEL	RATIOCOMB	ACCEL	RATIOCOMB	ACCEL	RATIOCOMB
007	AH	1.0604 0.3535	1	1.0932 0.3664	1	1.4134 0.4711
	AV	0.7871 0.2624	1	0.3774 0.2325	1	1.2375 0.4292
014	AH	1.5956 0.5652	1	1.3587 0.4529	1	2.7275 0.3092
	AV	1.0331 0.3444	1	0.5663 0.2221	1	1.7891 0.5954

ALL NODE ACCELERATION HAVE BEEN PROCESSED

TABLE B5 GUIDE LOADS SUMMARY

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A

MODE/VELN	LEVEL A			LEVEL B			LEVEL C			LEVEL D		
	MOMENT	ALLOW	RATIO	MOMENT	ALLOW	RATIO	MOMENT	ALLOW	RATIO	MOMENT	ALLOW	RATIO
003. GUIDE												
FX	5923.	0.	0.	75807.	0.	0.	28584.	0.	0.	142503.	0.	0.
FY	36127.	0.	0.	76309.	0.	0.	51613.	0.	0.	137331.	0.	0.
FZ	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MX	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MY	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MZ	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TABLE B6 HEAD FITTING LOADS SUMMARY

ABWR K7 FEEDWATER A		FW HEAD FITTFLANGE MOMENT								
NODE=003		FA	FB	FC	MA	MB	MC	MR	ALLOW	RATIO
LEVEL A A	1	13262.	1314.	4506.	269841.	332526.	344657.	549705.		
LEVEL A A	2	13262.	1314.	4506.	269841.	332526.	344657.	549705.		
LEVEL B	1	42541.	18517.	27954.	722181.	1961252.	1502789.	2574185.		
LEVEL B	2	29414.	17267.	23613.	538659.	1640081.	1289426.	2154679.		
LEVEL B *A	3	58694.	34471.	461.	950999.	3268807.	2447559.	4202109.		
LEVEL C	1	17215.	10569.	7972.	352259.	522881.	822499.	1036338.		
LEVEL D	1	53244.	29818.	44974.	868227.	3066611.	2138971.	3838375.		
LEVEL D	2	52956.	30244.	45047.	883465.	3071576.	2155330.	3860537.		
LEVEL D	3	51005.	23005.	44475.	839515.	3035307.	2042583.	3753667.		

x Thermal stratifications loads must be added to these loads

** weight load must be subtracted from these loads

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

TABLE C1 SNUBBER DETAIL LOADS

ABWR K7 FEEDWATER A

SNB PIPE NODE-019, AS003 65000.

		FORCE	D.	DISP. Y	DISP. Z
THERMAL	CASE 1	0.	0.861	0.516	0.450
THERMAL	CASE 2	0.	0.012	0.286	-0.227
THERMAL	CASE 3	0.	0.338	0.372	0.041
THERMAL	CASE 4	0.	0.567	0.425	0.216
WEIGHT	CASE 1	0.	-0.005	-0.109	0.005
RV2 I	CASE 1	4370.	0.010	0.015	0.003
RV2 SV11	CASE 1	1748.	0.004	0.006	0.001
RV2 I	CASE 2	7402.	0.078	0.134	0.030
RV2 SV11	CASE 2	2961.	0.031	0.053	0.012
RV2 I	CASE 3	2883.	0.007	0.011	0.010
RV2 SV11	CASE 3	1153.	0.003	0.004	0.004
CHUG. I	CASE 1	1243.	0.003	0.004	0.001
CHUG. I	CASE 2	854.	0.001	0.002	0.001
CHUG. I	CASE 3	1372.	0.004	0.006	0.006
A.P.I.	CASE 1	9868.	0.020	0.029	0.010
A.P.I.	CASE 2	6160.	0.013	0.019	0.007
A.P.I.	CASE 3	9584.	0.021	0.032	0.018
A.P.I.	CASE 7	7967.	0.017	0.024	0.017
A.P.I.	CASE 8	5024.	0.011	0.015	0.011
A.P.I.	CASE 9	7938.	0.019	0.027	0.021
A.P.D.	CASE 1	-129.	-0.001	0.000	-0.001
A.P.D.	CASE 7	640.	0.002	0.002	0.003
SSEI	CASE 1	55354.	0.250	0.413	0.325
SEISMIC	CASE 1	27677.	0.125	0.207	0.163
SSEI	CASE 2	16373.	0.071	0.118	0.055
SEISMIC	CASE 2	8186.	0.035	0.059	0.028
SSEI	CASE 3	42168.	0.159	0.254	0.247
SEISMIC	CASE 3	21084.	0.079	0.127	0.124
SSED	CASE 1	20.	0.398	0.001	0.013
SSED	CASE 2	-6789.	-0.040	-0.023	0.418
COND. I	CASE 2	5467.	0.032	0.052	0.011
OBE D	CASE 1	10.	0.195	0.001	0.007
OBE D	CASE 2	-3394.	-0.020	-0.011	0.209

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A
SNB PIPE NODE=019 AS003

SERVICE	COMB NO.	SUM	ALLOW	RATIO
LEVL B	1	37031	65000	0.5697
LEVL C	1	9293	86640	0.1073
LEVL D	1	72406	97500	0.7426
LEVL D	2	72583	97500	0.7444
LEVL D	3	72922	97500	0.7479

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A

SNB PIPE NODE=025. AS004 65000.

	FORCE	DISP. X	DISP. Y	DISP. Z
THERMAL	CASE 1	1.175	0.730	0.646
THERMAL	CASE 2	0.061	0.388	-0.252
THERMAL	CASE 3	0.493	0.517	0.103
THERMAL	CASE 4	0.791	0.594	0.337
WEIGHT	CASE 1	-0.010	-0.023	0.007
RV2 I	CASE 1	0.006	0.007	0.004
RV2 SV11	CASE 1	0.003	0.003	0.001
RV2 I	CASE 2	0.014	0.028	0.045
RV2 SV11	CASE 2	0.005	0.011	0.018
RV2 I	CASE 3	0.003	0.004	0.015
RV2 SV11	CASE 3	0.001	0.002	0.006
CHUG. I	CASE 1	0.002	0.002	0.001
CHUG. I	CASE 2	0.001	0.002	0.001
CHUG. I	CASE 3	0.001	0.002	0.010
A.P.I.	CASE 1	0.014	0.015	0.017
A.P.I.	CASE 2	0.009	0.010	0.011
A.P.I.	CASE 3	0.014	0.015	0.029
A.P.I.	CASE 7	0.011	0.009	0.028
A.P.I.	CASE 8	0.007	0.006	0.018
A.P.I.	CASE 9	0.010	0.009	0.035
A.P.D.	CASE 1	0.002	-0.001	-0.002
A.P.D.	CASE 7	0.000	0.000	0.004
SSEI	CASE 1	0.037	0.086	0.534
SEISMIC	CASE 1	0.019	0.043	0.267
SSEI	CASE 2	0.021	0.028	0.090
SEISMIC	CASE 2	0.010	0.014	0.045
SSEI	CASE 3	0.025	0.052	0.406
SEISMIC	CASE 3	0.012	0.026	0.203
SSED	CASE 1	0.378	0.001	0.024
SSED	CASE 2	-0.014	-0.007	0.419
COND. I	CASE 2	0.009	0.014	0.014
OBE D	CASE 1	0.189	0.000	0.012
OBE D	CASE 2	-0.007	-0.003	0.209

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A
SNB PIPE MODE=025 AS004

SERVICE	CONB NO.	SUM	ALLOW	RATIO
LEVL B	1	40262.	65000.	0.6194
LEVL C	1	20939.	86640.	0.2417
LEVL D	1	72010.	97500.	0.7386
LEVL D	2	72686.	97500.	0.7455
LEVL D	3	69508.	97500.	0.7129

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A

SNB PIPE NODE=025. AS005 40000.

	FORCE	DISP. X	DISP. Y	DISP. Z
THERMAL	CASE 1	1.175	0.730	0.646
THERMAL	CASE 2	0.	0.386	-0.252
THERMAL	CASE 3	0.493	0.517	0.103
THERMAL	CASE 4	0.791	0.594	0.337
WEIGHT	CASE 1	-0.010	-0.023	0.007
RV2 I	CASE 1	0.006	0.007	0.004
RV2 SV11	CASE 1	0.003	0.003	0.001
RV2 I	CASE 2	0.014	0.028	0.045
RV2 SV11	CASE 2	0.005	0.011	0.018
RV2 I	CASE 3	0.003	0.004	0.015
RV2 SV11	CASE 3	0.001	0.002	0.006
CHUG. I	CASE 1	0.002	0.002	0.001
CHUG. I	CASE 2	0.001	0.002	0.001
CHUG. I	CASE 3	0.001	0.002	0.010
A.P.I.	CASE 1	0.014	0.015	0.017
A.P.I.	CASE 2	0.009	0.010	0.011
A.P.I.	CASE 3	0.014	0.015	0.029
A.P.I.	CASE 7	0.011	0.009	0.028
A.P.I.	CASE 8	0.007	0.006	0.018
A.P.I.	CASE 9	0.010	0.009	0.035
A.P.D.	CASE 1	0.002	-0.001	-0.002
A.P.D.	CASE 7	0.000	0.000	0.004
SSEI	CASE 1	0.037	0.086	0.534
SEISMIC	CASE 1	0.019	0.043	0.267
SSEI	CASE 2	0.021	0.028	0.090
SEISMIC	CASE 2	0.010	0.014	0.045
SSEI	CASE 3	0.025	0.052	0.406
SEISMIC	CASE 3	0.012	0.026	0.203
SSED	CASE 1	0.378	0.001	0.024
SSD	CASE 2	-0.014	-0.007	0.419
COND. I	CASE 2	0.009	0.014	0.014
OBE D	CASE 1	0.189	0.000	0.012
OBE D	CASE 2	-0.007	-0.003	0.209

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A
SNB PIPE NODE-025 AS005

SERVICE	COMB NO.	SUM	ALLOW	RATIO
LEVEL B	1	19747.	40000.	0.4937
LEVEL C	1	8528.	53320.	0.1599
LEVEL D	1	36723.	60000.	0.6120
LEVEL D	2	37006.	60000.	0.6168
LEVEL D	3	37492.	60000.	0.6249

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A

SNB PIPE NODE=032 AS006 40000.

	FORCE	DISP. X	DISP. Y	DISP. Z
THERMAL	CASE 1	1.236	0.962	1.083
THERMAL	CASE 2	0.	0.595	-0.273
THERMAL	CASE 3	0.	0.735	0.259
THERMAL	CASE 4	0.	0.811	0.616
WEIGHT	CASE 1	-0.018	-0.029	0.007
RV2 I	CASE 1	0.006	0.005	0.004
RV2 SV11	CASE 1	0.002	0.002	0.001
RV2 I	CASE 2	0.017	0.021	0.045
RV2 SV11	CASE 2	0.007	0.008	0.018
RV2 I	CASE 3	0.003	0.003	0.015
RV2 SV11	CASE 3	0.001	0.001	0.006
CHUG. I	CASE 1	0.001	0.002	0.001
CHUG. I	CASE 2	0.001	0.001	0.001
CHUG. I	CASE 3	0.001	0.001	0.010
A.P. I.	CASE 1	0.013	0.011	0.017
A.P. I.	CASE 2	0.008	0.007	0.011
A.P. I.	CASE 3	0.011	0.011	0.029
A.P. I.	CASE 7	0.006	0.006	0.028
A.P. I.	CASE 8	0.004	0.004	0.018
A.P. I.	CASE 9	0.006	0.007	0.035
A.P. D.	CASE 1	0.004	-0.001	-0.002
A.P. D.	CASE 7	-0.000	-0.000	0.004
SSEI	CASE 1	0.042	0.052	0.537
SEISMIC	CASE 1	0.021	0.026	0.268
SSEI	CASE 2	0.032	0.023	0.091
SEISMIC	CASE 2	0.016	0.011	0.045
SSEI	CASE 3	0.019	0.030	0.408
SEISMIC	CASE 3	0.010	0.015	0.204
SSD	CASE 1	0.372	0.000	0.024
SSD	CASE 2	0.003	0.001	0.419
COND. I	CASE 2	0.016	0.015	0.014
OBE D	CASE 1	0.186	0.000	0.012
OBE D	CASE 2	0.001	0.001	0.209

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A
SN8 PIPE NODE-032 AS006

SERVICE	COMP NO	SUM	ALLOW	RATIO
LEVL B	1	17730.	40000.	0.4447
LEVL C	1	8713.	53320.	0.1634
LEVL D	1	32324.	60000.	0.5387
LEVL D	2	33367.	60000.	0.5561
LEVL D	3	31903.	60000.	0.5317

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A

SNB PIPE NODE=027, AS007 40000

	FORCE	DISP. X	DISP. Y	DISP. Z
THERMAL	CASE 1	1.239	0.988	1.132
THERMAL	CASE 2	0.180	0.617	-0.275
THERMAL	CASE 3	0.599	0.759	0.277
THERMAL	CASE 4	0.878	0.836	0.647
WEIGHT	CASE 1	-0.019	-0.039	0.007
RV2 I	CASE 1	0.006	0.006	0.004
RV2 SV11	CASE 1	0.002	0.002	0.001
RV2 I	CASE 2	0.018	0.024	0.045
RV2 SV11	CASE 2	0.007	0.009	0.018
RV2 I	CASE 3	0.003	0.004	0.015
RV2 SV11	CASE 3	0.001	0.002	0.006
CHUG. I	CASE 1	0.002	0.002	0.001
CHUG. I	CASE 2	0.001	0.001	0.001
CHUG. I	CASE 3	0.001	0.001	0.010
A.P.I.	CASE 1	0.014	0.014	0.017
A.P.I.	CASE 2	0.009	0.009	0.011
A.P.I.	CASE 3	0.012	0.014	0.029
A.P.I.	CASE 7	0.006	0.008	0.028
A.P.I.	CASE 8	0.004	0.005	0.018
A.P.I.	CASE 9	0.006	0.009	0.035
A.P.D.	CASE 1	-0.004	-0.002	-0.002
A.P.D.	CASE 7	-0.000	-0.000	0.004
SSEI	CASE 1	0.047	0.061	0.537
SEISMIC	CASE 1	0.023	0.030	0.268
SSEI	CASE 2	0.040	0.031	0.091
SEISMIC	CASE 2	0.020	0.015	0.045
SSEI	CASE 3	0.023	0.033	0.408
SEISMIC	CASE 3	0.012	0.017	0.204
SSD	CASE 1	0.373	0.000	0.024
SSD	CASE 2	0.003	0.001	0.419
COND. I	CASE 2	0.020	0.019	0.014
OBE D	CASE 1	0.186	0.000	0.012
OBE D	CASE 2	-0.001	0.001	0.209

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A
SNB PIPE NODE*027 AS002

SERVICE	COMB N°	SUM	ALLOW	RATIO
LEVL B	1	19800.	40000.	0.4950
LEVL C	1	12605.	53320.	0.2364
LEVL D	1	33105.	60000.	0.5517
LEVL D	2	34091.	60000.	0.5682
LEVL D	3	31539.	60000.	0.5256

TABLE C2.1 RPV NOZZLE DETAIL - LOADS

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION
ABWR K7 FEEDWATER 4

NOZL	MODE-056	FA	FB	FC	MA	MB	MC
THERMAL	CASE 1	99	2777	10669	-437998	322610	-276327
THERMAL	CASE 2	-694	1423	849	89749	126959	-212182
THERMAL	CASE 3	-485	1906	4664	-122319	440878	-245022
THERMAL	CASE 4	-235	2266	7301	-262172	552633	-256084
WEIGHT	CASE 1	157	4274	360	19877	20070	-258783
RV2 I	CASE 1	733	1748	1120	12799	76531	124797
RV2 SV11	CASE 1	293	599	448	5120	30632	49919
RV2 I	CASE 2	3586	4589	1319	81727	108198	350290
RV2 SV11	CASE 2	1434	1835	527	32691	43279	140116
RV2 I	CASE 3	917	1519	830	12965	54459	94594
RV2 SV11	CASE 3	367	607	332	5186	21789	37837
CPUG I	CASE 1	442	793	584	4085	34038	49887
CHUG I	CASE 2	231	896	340	3421	22026	42265
CHUG I	CASE 3	703	1003	474	7000	29267	59310
A P I	CASE 1	1705	3886	1946	31389	131542	298190
A P I	CASE 2	987	2592	1164	21688	81944	197889
A P I	CASE 3	1450	3845	1836	34533	138381	294783
A P I	CASE 7	2999	1911	1339	36587	92016	196231
A P I	CASE 8	1727	1287	840	23959	59382	128144
A P I	CASE 9	2485	2004	1271	40489	96428	210610
A P D	CASE 1	-272	-212	-918	37809	-57782	3762
A P D	CASE 7	16	-55	-246	10120	-23235	5226
SSEI	CASE 1	3909	11385	6873	323210	616056	952146
SEISMIC	CASE 1	4455	5693	3437	161605	308028	476073
SSEI	CASE 2	3544	4449	2826	82097	256731	394677
SEISMIC	CASE 2	1772	2224	1413	41049	123366	197339
SSEI	CASE 3	10977	5312	5957	269024	514042	900737
SEISMIC	CASE 3	5489	2956	2979	134512	257021	450369
SSED	CASE 1	30	69	306	-12515	22513	-894
SSED	CASE 2	-205	-123	-680	29193	-49118	-3551
CNO I	CASE 2	1730	3665	1183	44481	90739	250400
OBE D	CASE 1	45	35	153	-6257	11257	-447
OBE D	CASE 2	-192	-61	-340	14596	-24559	-1775

TABLE C2.2 RRV NOZZLE DETAIL LOADS

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ASWR K7 FEEDWATER A

NOZL	MODE=074	FA	FB	FC	MA	MB	MC
THERMAL	CASE 1	-1848	-1062	3917	-541854	561423	47677
THERMAL	CASE 2	-10357	-1433	-1907	52228	-244017	-431228
THERMAL	CASE 3	-7067	-1234	1283	-109172	123257	-254804
THERMAL	CASE 4	-4776	-1192	3335	-211120	361764	-118382
WEIGHT	CASE 1	-259	3218	78	1521	11132	-187122
RV2 I	CASE 1	936	1081	822	26974	49147	70512
RV2 SV11	CASE 1	374	432	329	10789	19639	28205
RV2 I	CASE 2	1019	2889	1132	38377	77476	220800
RV2 SV11	CASE 2	408	1156	453	15351	30950	88320
RV2 I	CASE 3	284	922	823	18555	47040	52202
RV2 SV11	CASE 3	114	369	329	7422	18816	24881
CHUG I	CASE 1	737	549	228	7279	13552	38866
CHUG I	CASE 2	153	749	350	5520	21137	28341
CHUG I	CASE 3	162	445	458	7429	22872	28340
A P I	CASE 1	2747	1643	1824	60202	109921	118310
A P I	CASE 2	1472	1115	1145	37749	69049	31220
A P I	CASE 3	1589	1946	1860	51288	113527	136476
A P I	CASE 7	436	1205	2033	49472	105472	95691
A P I	CASE 8	278	792	1191	31137	54147	55904
A P I	CASE 9	446	1408	1747	51139	101336	99291
A P D	CASE 1	-1852	-944	-6	392	-876	10261
A P D	CASE 7	-7	-2	-237	11948	-26977	-130
SSEI	CASE 1	3247	4803	7351	230124	631278	392383
SEISMIC	CASE 1	1823	2401	3676	145062	315639	196191
SSEI	CASE 2	1206	1735	3671	12541	232628	141510
SEISMIC	CASE 2	603	868	1835	51270	116314	70755
SSEI	CASE 3	1042	2342	5767	211224	492981	173379
SEISMIC	CASE 3	521	1171	2884	110612	241491	86589
SSED	CASE 1	-77	-34	151	-7337	17975	49
SSED	CASE 2	4	-9	-248	11283	-30786	918
COND I	CASE 2	711	2439	1192	35415	73092	159493
ORE D	CASE 1	-38	-17	76	-3678	8988	25
ORE D	CASE 2	2	-5	-124	5541	-15393	459

TABLE C2.3 RPV NOZZLE DETAIL LOADS

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A

NOZL	NODE-095	FA	FB	FC	HA	HB	HC
THERMAL	CASE 1	810.	-989.	2501.	-51502.	300250.	163753.
THERMAL	CASE 2	62.	1631.	-7046.	229474.	-642248.	-143416.
THERMAL	CASE 3	379.	564.	-3314.	126619.	-270274.	-23520.
THERMAL	CASE 4	574.	-113.	-760.	47986.	-19032.	58116.
WEIGHT	CASE 1	53.	4261.	-66.	-36246.	-1311.	-261162.
RV2 1	CASE 1	717.	1387.	911.	16526.	65617.	109597.
RV2 SV11	CASE 1	287.	555.	364.	6610.	26247.	43839.
RV2 1	CASE 2	3032.	5608.	1887.	107738.	145964.	529415.
RV2 SV11	CASE 2	1213.	2643.	755.	43095.	58386.	211766.
RV2 1	CASE 3	813.	1157.	798.	12395.	52419.	75916.
RV2 SV11	CASE 3	325.	463.	319.	4958.	20967.	30366.
CHUG. 1	CASE 1	415.	596.	462.	4612.	26224.	39663.
CHUG. 1	CASE 2	253.	904.	595.	5390.	36707.	40824.
CHUG. 1	CASE 3	551.	724.	446.	6522.	27706.	43577.
A.P. 1.	CASE 1	1846.	2835.	1778.	37168.	125991.	244718.
A.P. 1.	CASE 2	1090.	2015.	1053.	26055.	78387.	171060.
A.P. 1.	CASE 3	1579.	3016.	1605.	39659.	129317.	257574.
A.P. 1.	CASE 7	2778.	1548.	1102.	27005.	79719.	156264.
A.P. 1.	CASE 8	1561.	1054.	584.	17853.	51408.	102553.
A.P. 1.	CASE 9	2139.	1711.	1004.	30449.	82987.	169623.
A.P. D.	CASE 1	-246.	-194.	838.	-34570.	52435.	3352.
A.P. D.	CASE 7	-8.	55.	-254.	10450.	-23563.	-5534.
SEI	CASE 1	3804.	11555.	7757.	351990.	687410.	1128153.
SEISMIC	CASE 1	4902.	5778.	3878.	177995.	343705.	564077.
SEI	CASE 2	3292.	4806.	3520.	111219.	284646.	440349.
SEISMIC	CASE 2	1646.	2403.	760.	55609.	142323.	220175.
SEI	CASE 3	3053.	4554.	5403.	239262.	491637.	697121.
SEISMIC	CASE 3	4527.	2277.	2702.	119631.	245819.	348560.
SEI	CASE 1	-2.	-44.	213.	-8906.	13763.	3958.
SEI	CASE 2	16.	76.	-380.	15109.	-32958.	-6026.
CONO. 1	CASE 2	1719.	4620.	1760.	62647.	122590.	350919.
ORE D	CASE 1	-1.	-22.	106.	-4453.	9382.	1979.
ORE D	CASE 2	8.	38.	-190.	4055.	-16479.	-3013.

TABLE C3.1 VALVE ACCELERATIONS

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A

CHECK VALVE MODE=007

LOAD TYPE	CASE	AX	AY	AZ
RV2 I	1	0.64028	0.29040	0.13053
RV2 SV11	1	0.25611	0.11616	0.01021
RV2 I	2	0.51184	0.59313	0.20929
RV2 SV11	2	0.20474	0.23965	0.08372
RV2 I	3	0.29394	0.12881	0.33869
RV2 SV11	3	0.11758	0.25152	0.13548
CHUG I	1	0.37505	0.17430	0.06404
CHUG I	2	0.12646	0.52268	0.17639
CHUG I	3	0.17495	0.08034	0.24256
A.P.I.	1	0.34020	0.22483	0.09467
A.P.I.	2	0.13375	0.14099	0.05391
A.P.I.	3	0.44369	0.25470	0.11381
A.P.I.	7	0.18022	0.10657	0.06249
A.P.I.	8	0.12740	0.07988	0.14886
A.P.I.	9	0.19287	0.11355	0.10039
SSEI	1	0.65961	0.68336	0.17493
SEISMIC	1	0.32981	0.34158	0.08747
SSEI	2	0.31413	0.27697	0.07623
SEISMIC	2	0.15706	0.13848	0.03811
SSEI	3	0.45972	0.30827	0.08956
SEISMIC	3	0.22916	0.15413	0.04478
COND. I	2	0.45271	0.74767	0.26710

LEVEL	COMB NO.	AH	AAH	RATIO	AV	AAV	RATIO
LEVL B	1	1.05035	3.00000	0.35345	0.78713	3.00000	0.25238
LEVL C	1	1.09922	3.00000	0.35541	0.97745	3.00000	0.29248
LEVL D	1	1.41344	3.00000	0.47115	1.18536	3.00000	0.39562
LEVL D	2	1.41156	3.00000	0.47053	1.28748	3.00000	0.42316
LEVL D	3	1.02528	3.00000	0.34176	0.84646	3.00000	0.23213

TABLE C3.2 VALVE ACCELERATIONS

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A

GATE VALVE MODE=D14

LOAD TYPE	CASE	AX	AY	AZ
RV2 I	1	0.50411	0.24407	0.19988
RV2 SV11	1	0.20154	0.09763	0.07595
RV2 I	2	0.81112	0.56600	0.48233
RV2 SV11	2	0.32445	0.22640	0.19293
RV2 I	3	0.26819	0.14938	0.52794
RV2 SV11	3	0.10728	0.05975	0.21117
CHUG. I	1	0.23321	0.13028	0.10963
CHUG. I	2	0.17437	0.12161	0.24212
CHUG. I	3	0.11717	0.09959	0.37649
A.P. I.	1	0.48169	0.38038	0.30838
A.P. I.	2	0.31246	0.25384	0.20025
A.P. I.	3	0.54998	0.37797	0.31431
A.P. I.	7	0.22472	0.18686	0.16217
A.P. I.	8	0.15795	0.13920	0.24652
A.P. I.	9	0.24637	0.19181	0.20347
A.P. I.	1	1.63817	1.39572	1.03410
SEISMIC	1	0.81908	0.69786	0.51705
SEISMIC	2	0.67533	0.55977	0.41916
SEISMIC	2	0.33767	0.27989	0.20958
SEISMIC	3	0.87407	0.53131	0.45856
SEISMIC	3	0.43703	0.31365	0.22928
COND. I	2	0.59882	0.37225	0.43131

LEVEL	COMB NO.	AH	AAH	RATIO	AV	AAV	RATIO
LEVEL B	1	1.59559	3.00000	0.56520	1.03306	3.00000	0.34435
LEVEL C	1	1.35875	3.00000	0.45292	0.65627	3.00000	0.22209
LEVEL D	1	2.62425	3.00000	0.39475	1.76178	3.00000	0.58726
LEVEL D	2	2.72751	3.00000	0.90917	1.78906	3.00000	0.59635
LEVEL D	3	2.42123	3.00000	0.80703	1.68511	3.00000	0.56170

TABLE C4.1 GUIDE DETAIL LOADS

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A

GGD NODE=009.

		FX	FY	FZ	MX	MY	MZ
THERMAL	CASE 1	1333.	-1079.	0.	0.	0.	0.
THERMAL	CASE 2	-5550.	-2870.	0.	0.	0.	0.
THERMAL	CASE 3	-3277.	-2097.	0.	0.	0.	0.
THERMAL	CASE 4	-1264.	-1507.	0.	0.	0.	0.
WEIGHT	CASE 1	379.	33255.	0.	0.	0.	0.
RV2 I	CASE 1	7344.	3672.	0.	0.	0.	0.
RV2 SV11	CASE 1	2938.	1459.	0.	0.	0.	0.
RV2 I	CASE 2	20454.	23066.	0.	0.	0.	0.
RV2 SV11	CASE 2	8182.	9227.	0.	0.	0.	0.
RV2 I	CASE 3	4568.	2474.	0.	0.	0.	0.
RV2 SV11	CASE 3	1827.	990.	0.	0.	0.	0.
CHUG. I	CASE 1	3867.	1251.	0.	0.	0.	0.
CHUG. I	CASE 2	1733.	9697.	0.	0.	0.	0.
CHUG. I	CASE 3	2579.	1515.	0.	0.	0.	0.
A.P. I.	CASE 1	7184.	8644.	0.	0.	0.	0.
A.P. I.	CASE 2	4634.	3866.	0.	0.	0.	0.
A.P. I.	CASE 3	9321.	9539.	0.	0.	0.	0.
A.P. I.	CASE 7	6591.	4522.	0.	0.	0.	0.
A.P. I.	CASE 8	4283.	3221.	0.	0.	0.	0.
A.P. I.	CASE 9	7758.	4806.	0.	0.	0.	0.
A.P. D.	CASE 1	-367.	-39.	0.	0.	0.	0.
A.P. D.	CASE 7	-305.	-36.	0.	0.	0.	0.
SSEI	CASE 1	107004.	55487.	0.	0.	0.	0.
SEISMIC	CASE 1	53502.	27744.	0.	0.	0.	0.
SSEI	CASE 2	22564.	19535.	0.	0.	0.	0.
SEISMIC	CASE 2	11282.	9768.	0.	0.	0.	0.
SSEI	CASE 3	78124.	28112.	0.	0.	0.	0.
SEISMIC	CASE 3	39062.	14036.	0.	0.	0.	0.
SSED	CASE 1	6599.	-4.	0.	0.	0.	0.
SSED	CASE 2	-4055.	399.	0.	0.	0.	0.
COND. I	CASE 2	9848.	15352.	0.	0.	0.	0.
DBE D	CASE 1	3300.	-2.	0.	0.	0.	0.
DBE D	CASE 2	-2028.	439.	0.	0.	0.	0.

TABLE C4.2 GUIDE COMBINED LOADS

GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATION

ABWR K7 FEEDWATER A

GGD	MODE=009.	FX	FY	FR
LEVEL A	1	5929.	36127.	36610.
LEVEL A	2	5929.	36127.	36610.
LEVEL B	1	76807.	76309.	108270.
LEVEL C	1	29594.	61613.	67962.
LEVEL D	1	142238.	106129.	177468.
LEVEL D	2	142503.	107331.	178401.
LEVEL D	3	140871.	102057.	173954.

TABLE C5 HEAD FITTING DETAIL LOADS

ABWR K7 FEEDWATER A

004.		FW HEAD FITTING FLANGE MOMENT					
		FA	FB	FC	MA	MB	MC
THERMAL	CASE 1	-13127.	-353.	4341.	183521.	-321171.	213362.
THERMAL	CASE 2	4351.	-1250.	1714.	-92271.	-140783.	160492.
THERMAL	CASE 3	-2707.	-862.	3065.	14379.	-233654.	185249.
THERMAL	CASE 4	-7307.	-546.	3639.	82657.	-273009.	204467.
WEIGHT	CASE 1	-135.	-64.	-165.	-86320.	11355.	131294.
RV2 I	CASE 1	4606.	2236.	2743.	76341.	159620.	140143.
RV2 SVII	CASE 1	1842.	894.	1097.	30536.	63848.	56057.
RV2 I	CASE 2	8440.	9813.	6675.	247777.	462828.	655490.
RV2 SVII	CASE 2	3376.	3925.	2750.	99111.	185131.	262196.
RV2 I	CASE 3	11090.	951.	1587.	44350.	97540.	59774.
RV2 SVII	CASE 3	4436.	380.	635.	17740.	39016.	23910.
CHUG. I	CASE 1	2589.	1047.	1558.	28400.	89103.	62156.
CHUG. I	CASE 2	2756.	2618.	523.	21137.	30538.	142128.
CHUG. I	CASE 3	7872.	474.	976.	16755.	59870.	28646.
A.P.I.	CASE 1	5487.	4206.	2446.	140414.	158730.	280143.
A.P.I.	CASE 2	3462.	2848.	1537.	95466.	106585.	190045.
A.P.I.	CASE 3	6119.	4182.	3052.	143733.	197127.	277708.
A.P.I.	CASE 7	3570.	2159.	2362.	74553.	158741.	144271.
A.P.I.	CASE 8	5101.	1501.	1517.	51573.	101354.	100191.
A.P.I.	CASE 9	4637.	2263.	2674.	77384.	180262.	151325.
STRAH	CASE 1	2290.	-8690.	1490.	-1130000.	-103000.	-5260000.
A.P.D.	CASE 1	130.	-19.	228.	-360.	-33316.	-1327.
A.P.D.	CASE 7	-21.	-33.	122.	2976.	-8380.	-2279.
SSEI	CASE 1	39926.	23770.	35145.	615626.	2399125.	1609284.
SEISMIC	CASE 1	19963.	11885.	17572.	307813.	1199563.	804742.
SSEI	CASE 2	8598.	8524.	7633.	237736.	518274.	575549.
SEISMIC	CASE 2	4299.	4262.	3817.	118868.	259137.	287775.
SSEI	CASE 3	29340.	11715.	25564.	324254.	1746002.	794953.
SEISMIC	CASE 3	14670.	5858.	12782.	162127.	873001.	397475.
SSED	CASE 1	-348.	2.	-4791.	1597.	735080.	125.
SSED	CASE 2	6195.	343.	438.	-32170.	-30212.	23607.
COMD. I	CASE 2	6767.	5806.	3187.	159990.	206930.	362516.
OBE D	CASE 1	-174.	1.	-2395.	798.	367540.	63.
OBE D	CASE 2	3098.	171.	219.	-16085.	-15106.	11803.
ITRAN	CASE 1	1110.	-1760.	1850.	204000.	-129000.	-122000.

TABLE DI PIPE DISPLACEMENTS & ROTATIONS BY NODE DUE TO NORMAL OPERATION.

JOINT LABEL	X-			Y-			Z-			X-			Y-			Z-		
	TRANSLATION	ROTATION	ROTATION	TRANSLATION	ROTATION	ROTATION	TRANSLATION	ROTATION	ROTATION	TRANSLATION	ROTATION	ROTATION	TRANSLATION	ROTATION	ROTATION	TRANSLATION	ROTATION	ROTATION
001	3.4000E-02	1.2900E-01	-1.8500E-01	1.2900E-01	-2.3385E-07	-6.8398E-08	1.8500E-01	-2.3385E-07	-6.8398E-08	1.8500E-01	-2.3385E-07	-6.8398E-08	1.8500E-01	-2.3385E-07	-6.8398E-08	1.8500E-01	-2.3385E-07	-6.8398E-08
002	3.4096E-02	1.2842E-01	-2.4983E-01	1.2842E-01	-1.7459E-05	-1.5494E-05	1.2842E-01	-1.7459E-05	-1.5494E-05	1.2842E-01	-1.7459E-05	-1.5494E-05	1.2842E-01	-1.7459E-05	-1.5494E-05	1.2842E-01	-1.7459E-05	-1.5494E-05
003	3.4024E-02	1.2850E-01	-2.3935E-01	1.2850E-01	-1.7418E-05	-1.6051E-05	1.2850E-01	-1.7418E-05	-1.6051E-05	1.2850E-01	-1.7418E-05	-1.6051E-05	1.2850E-01	-1.7418E-05	-1.6051E-05	1.2850E-01	-1.7418E-05	-1.6051E-05
004	2.1100E-02	1.5073E-01	1.2513E-01	1.5073E-01	-2.9451E-04	-1.6036E-05	1.5073E-01	-2.9451E-04	-1.6036E-05	1.5073E-01	-2.9451E-04	-1.6036E-05	1.5073E-01	-2.9451E-04	-1.6036E-05	1.5073E-01	-2.9451E-04	-1.6036E-05
005	2.1005E-02	1.5506E-01	1.5975E-01	1.5506E-01	-3.2396E-04	2.2583E-05	1.5506E-01	-3.2396E-04	2.2583E-05	1.5506E-01	-3.2396E-04	2.2583E-05	1.5506E-01	-3.2396E-04	2.2583E-05	1.5506E-01	-3.2396E-04	2.2583E-05
006	2.2325E-02	1.6481E-01	2.2909E-01	1.6481E-01	-3.6114E-04	8.2474E-05	1.6481E-01	-3.6114E-04	8.2474E-05	1.6481E-01	-3.6114E-04	8.2474E-05	1.6481E-01	-3.6114E-04	8.2474E-05	1.6481E-01	-3.6114E-04	8.2474E-05
007	1.6904E-02	2.0212E-01	2.2354E-01	2.0212E-01	-3.6114E-04	8.2474E-05	2.0212E-01	-3.6114E-04	8.2474E-05	2.0212E-01	-3.6114E-04	8.2474E-05	2.0212E-01	-3.6114E-04	8.2474E-05	2.0212E-01	-3.6114E-04	8.2474E-05
008	2.5583E-02	1.7564E-01	2.9843E-01	1.7564E-01	-3.9967E-04	1.5905E-04	1.7564E-01	-3.9967E-04	1.5905E-04	1.7564E-01	-3.9967E-04	1.5905E-04	1.7564E-01	-3.9967E-04	1.5905E-04	1.7564E-01	-3.9967E-04	1.5905E-04
009	2.9000E-02	1.8300E-01	3.4169E-01	1.8300E-01	-4.3997E-04	2.5065E-04	1.8300E-01	-4.3997E-04	2.5065E-04	1.8300E-01	-4.3997E-04	2.5065E-04	1.8300E-01	-4.3997E-04	2.5065E-04	1.8300E-01	-4.3997E-04	2.5065E-04
012	3.4188E-02	1.9125E-01	3.8571E-01	1.9125E-01	-4.8053E-04	3.5631E-04	1.9125E-01	-4.8053E-04	3.5631E-04	1.9125E-01	-4.8053E-04	3.5631E-04	1.9125E-01	-4.8053E-04	3.5631E-04	1.9125E-01	-4.8053E-04	3.5631E-04
013	4.5810E-02	2.0551E-01	4.5505E-01	2.0551E-01	-5.1742E-04	4.7610E-04	2.0551E-01	-5.1742E-04	4.7610E-04	2.0551E-01	-5.1742E-04	4.7610E-04	2.0551E-01	-5.1742E-04	4.7610E-04	2.0551E-01	-5.1742E-04	4.7610E-04
014	3.1273E-02	2.7877E-01	4.3949E-01	2.7877E-01	-5.5152E-04	5.1772E-04	2.7877E-01	-5.5152E-04	5.1772E-04	2.7877E-01	-5.5152E-04	5.1772E-04	2.7877E-01	-5.5152E-04	5.1772E-04	2.7877E-01	-5.5152E-04	5.1772E-04
015	6.1161E-02	2.2077E-01	5.2440E-01	2.2077E-01	-5.9278E-04	8.2814E-04	2.2077E-01	-5.9278E-04	8.2814E-04	2.2077E-01	-5.9278E-04	8.2814E-04	2.2077E-01	-5.9278E-04	8.2814E-04	2.2077E-01	-5.9278E-04	8.2814E-04
016	7.7137E-02	2.3371E-01	5.7991E-01	2.3371E-01	-6.1107E-04	1.8857E-03	2.3371E-01	-6.1107E-04	1.8857E-03	2.3371E-01	-6.1107E-04	1.8857E-03	2.3371E-01	-6.1107E-04	1.8857E-03	2.3371E-01	-6.1107E-04	1.8857E-03
018	1.8543E-01	2.7602E-01	4.9600E-01	2.7602E-01	-1.1140E-03	2.2940E-03	2.7602E-01	-1.1140E-03	2.2940E-03	2.7602E-01	-1.1140E-03	2.2940E-03	2.7602E-01	-1.1140E-03	2.2940E-03	2.7602E-01	-1.1140E-03	2.2940E-03
019	8.6113E-01	5.1610E-01	4.9600E-01	5.1610E-01	-1.1651E-03	1.9943E-03	5.1610E-01	-1.1651E-03	1.9943E-03	5.1610E-01	-1.1651E-03	1.9943E-03	5.1610E-01	-1.1651E-03	1.9943E-03	5.1610E-01	-1.1651E-03	1.9943E-03
021	1.0030E-00	5.7350E-01	4.1565E-01	5.7350E-01	-1.2493E-03	1.0515E-03	5.7350E-01	-1.2493E-03	1.0515E-03	5.7350E-01	-1.2493E-03	1.0515E-03	5.7350E-01	-1.2493E-03	1.0515E-03	5.7350E-01	-1.2493E-03	1.0515E-03
023	1.1180E-00	6.4019E-01	4.7197E-01	6.4019E-01	-1.2707E-03	7.3467E-04	6.4019E-01	-1.2707E-03	7.3467E-04	6.4019E-01	-1.2707E-03	7.3467E-04	6.4019E-01	-1.2707E-03	7.3467E-04	6.4019E-01	-1.2707E-03	7.3467E-04
024	1.1522E-00	6.9014E-01	5.6825E-01	6.9014E-01	-1.2657E-03	6.5456E-04	6.9014E-01	-1.2657E-03	6.5456E-04	6.9014E-01	-1.2657E-03	6.5456E-04	6.9014E-01	-1.2657E-03	6.5456E-04	6.9014E-01	-1.2657E-03	6.5456E-04
025	1.1744E-00	7.2990E-01	6.4589E-01	7.2990E-01	-1.3096E-03	4.2120E-04	7.2990E-01	-1.3096E-03	4.2120E-04	7.2990E-01	-1.3096E-03	4.2120E-04	7.2990E-01	-1.3096E-03	4.2120E-04	7.2990E-01	-1.3096E-03	4.2120E-04
029	1.2081E-00	8.0714E-01	7.9535E-01	8.0714E-01	-1.3526E-03	2.2326E-04	8.0714E-01	-1.3526E-03	2.2326E-04	8.0714E-01	-1.3526E-03	2.2326E-04	8.0714E-01	-1.3526E-03	2.2326E-04	8.0714E-01	-1.3526E-03	2.2326E-04
031	1.2207E-00	8.5705E-01	8.8824E-01	8.5705E-01	-1.3239E-03	1.4436E-04	8.5705E-01	-1.3239E-03	1.4436E-04	8.5705E-01	-1.3239E-03	1.4436E-04	8.5705E-01	-1.3239E-03	1.4436E-04	8.5705E-01	-1.3239E-03	1.4436E-04
032	1.2360E-00	9.6195E-01	1.0828E-00	9.6195E-01	-1.3242E-03	1.1130E-04	9.6195E-01	-1.3242E-03	1.1130E-04	9.6195E-01	-1.3242E-03	1.1130E-04	9.6195E-01	-1.3242E-03	1.1130E-04	9.6195E-01	-1.3242E-03	1.1130E-04
027	1.2386E-00	9.8792E-01	1.1314E-00	9.8792E-01	-1.3309E-03	4.7318E-05	9.8792E-01	-1.3309E-03	4.7318E-05	9.8792E-01	-1.3309E-03	4.7318E-05	9.8792E-01	-1.3309E-03	4.7318E-05	9.8792E-01	-1.3309E-03	4.7318E-05
034	1.2412E-00	1.0297E-00	1.2091E-00	1.0297E-00	-1.3309E-03	4.7318E-05	1.0297E-00	-1.3309E-03	4.7318E-05	1.0297E-00	-1.3309E-03	4.7318E-05	1.0297E-00	-1.3309E-03	4.7318E-05	1.0297E-00	-1.3309E-03	4.7318E-05
035	1.2424E-00	1.0611E-00	1.2674E-00	1.0611E-00	-1.3309E-03	4.7318E-05	1.0611E-00	-1.3309E-03	4.7318E-05	1.0611E-00	-1.3309E-03	4.7318E-05	1.0611E-00	-1.3309E-03	4.7318E-05	1.0611E-00	-1.3309E-03	4.7318E-05
036	1.2432E-00	1.0847E-00	1.3111E-00	1.0847E-00	-1.3309E-03	4.7318E-05	1.0847E-00	-1.3309E-03	4.7318E-05	1.0847E-00	-1.3309E-03	4.7318E-05	1.0847E-00	-1.3309E-03	4.7318E-05	1.0847E-00	-1.3309E-03	4.7318E-05
037	1.1042E-00	7.1418E-01	5.5229E-01	7.1418E-01	-1.2534E-03	-2.7275E-04	7.1418E-01	-1.2534E-03	-2.7275E-04	7.1418E-01	-1.2534E-03	-2.7275E-04	7.1418E-01	-1.2534E-03	-2.7275E-04	7.1418E-01	-1.2534E-03	-2.7275E-04
038	1.0784E-00	7.2931E-01	5.3731E-01	7.2931E-01	-1.1945E-03	-7.9645E-04	7.2931E-01	-1.1945E-03	-7.9645E-04	7.2931E-01	-1.1945E-03	-7.9645E-04	7.2931E-01	-1.1945E-03	-7.9645E-04	7.2931E-01	-1.1945E-03	-7.9645E-04
040	1.9444E-00	7.4303E-01	5.0821E-01	7.4303E-01	-1.5065E-03	-2.3617E-03	7.4303E-01	-1.5065E-03	-2.3617E-03	7.4303E-01	-1.5065E-03	-2.3617E-03	7.4303E-01	-1.5065E-03	-2.3617E-03	7.4303E-01	-1.5065E-03	-2.3617E-03
041	8.2325E-01	8.3322E-01	2.0781E-01	8.3322E-01	-1.1772E-03	-3.8068E-03	8.3322E-01	-1.1772E-03	-3.8068E-03	8.3322E-01	-1.1772E-03	-3.8068E-03	8.3322E-01	-1.1772E-03	-3.8068E-03	8.3322E-01	-1.1772E-03	-3.8068E-03
043	8.0930E-01	8.4175E-01	1.6638E-01	8.4175E-01	-1.1485E-03	-3.6286E-03	8.4175E-01	-1.1485E-03	-3.6286E-03	8.4175E-01	-1.1485E-03	-3.6286E-03	8.4175E-01	-1.1485E-03	-3.6286E-03	8.4175E-01	-1.1485E-03	-3.6286E-03
044	7.5068E-01	8.2710E-01	-3.7082E-01	8.2710E-01	-1.5092E-03	-3.4179E-03	8.2710E-01	-1.5092E-03	-3.4179E-03	8.2710E-01	-1.5092E-03	-3.4179E-03	8.2710E-01	-1.5092E-03	-3.4179E-03	8.2710E-01	-1.5092E-03	-3.4179E-03
046	7.1010E-01	8.3025E-01	-4.9232E-01	8.3025E-01	-2.6366E-03	-3.2650E-03	8.3025E-01	-2.6366E-03	-3.2650E-03	8.3025E-01	-2.6366E-03	-3.2650E-03	8.3025E-01	-2.6366E-03	-3.2650E-03	8.3025E-01	-2.6366E-03	-3.2650E-03
047	5.7544E-01	9.3495E-01	-6.0518E-01	9.3495E-01	-2.5067E-03	-3.2001E-03	9.3495E-01	-2.5067E-03	-3.2001E-03	9.3495E-01	-2.5067E-03	-3.2001E-03	9.3495E-01	-2.5067E-03	-3.2001E-03	9.3495E-01	-2.5067E-03	-3.2001E-03
049	5.3894E-01	9.5985E-01	-6.2632E-01	9.5985E-01	-2.1985E-03	-3.0648E-03	9.5985E-01	-2.1985E-03	-3.0648E-03	9.5985E-01	-2.1985E-03	-3.0648E-03	9.5985E-01	-2.1985E-03	-3.0648E-03	9.5985E-01	-2.1985E-03	-3.0648E-03
051	4.9778E-01	9.8156E-01	-6.3593E-01	9.8156E-01	-1.8589E-03	-2.5663E-03	9.8156E-01	-1.8589E-03	-2.5663E-03	9.8156E-01	-1.8589E-03	-2.5663E-03	9.8156E-01	-1.8589E-03	-2.5663E-03	9.8156E-01	-1.8589E-03	-2.5663E-03
053	4.6175E-01	9.9396E-01	-6.3190E-01	9.9396E-01	-1.5608E-03	-2.1390E-03	9.9396E-01	-1.5608E-03	-2.1390E-03	9.9396E-01	-1.5608E-03	-2.1390E-03	9.9396E-01	-1.5608E-03	-2.1390E-03	9.9396E-01	-1.5608E-03	-2.1390E-03
054	3.4983E-01	1.0120E-00	-5.7765E-01	1.0120E-00	-3.4787E-04	-8.5281E-04	1.0120E-00	-3.4787E-04	-8.5281E-04	1.0120E-00	-3.4787E-04	-8.5281E-04	1.0120E-00	-3.4787E-04	-8.5281E-04	1.0120E-00	-3.4787E-04	-8.5281E-04
055	3.1711E-01	1.0139E-00	-5.4476E-01	1.0139E-00	-4.5822E-05	-3.3426E-04	1.0139E-00	-4.5822E-05	-3.3426E-04	1.0139E-00	-4.5822E-05	-3.3426E-04	1.0139E-00	-4.5822E-05	-3.3426E-04	1.0139E-00	-4.5822E-05	-3.3426E-04
056	3.0800E-01	1.0140E-00	-5.3300E-01	1.0140E-00	-4.5808E-07	-3.0838E-04	1.0140E-00	-4.5808E-07	-3.0838E-04	1.0140E-00	-4.5808E-07	-3.0838E-04	1.0140E-00	-4.5808E-07	-3.0838E-04	1.0140E-00	-4.5808E-07	-3.0838E-04
057	2.9655E-01	1.0140E-00	-5.1788E-01	1.0140E-00	-4.5808E-07	-3.0838E-04	1.0140E-00	-4.5808E-07	-3.0838E-04	1.0140E-00	-4.5808E-07	-3.0838E-04	1.0140E-00	-4.5808E-07	-3.0838E-04	1.0140E-00	-4.5808E-07	-3.0838E-04
058	1.1710E-00	8.7909E-01	8.6166E-01															

TABLE DI CONTINUED

JOINT LABEL	K- TRANSLATION	Y- TRANSLATION	Z- TRANSLATION	K- ROTATION	Y- ROTATION	Z- ROTATION
064.	8.37593E-01	8.67000E-01	3.12699E-01	-3.62886E-03	-3.85708E-03	3.38554E-04
065.	8.26514E-01	9.71499E-01	1.61124E-01	-3.31727E-03	-3.24833E-03	2.45343E-04
067.	8.18516E-01	9.94207E-01	1.24582E-01	-2.67772E-03	-2.98039E-03	1.54505E-04
069.	8.00726E-01	1.01035E 00	8.92059E-02	-2.04004E-03	-2.44411E-03	8.80726E-05
071.	7.77400E-01	1.01599E 00	6.43292E-02	-1.61360E-03	-1.77988E-03	2.17296E-05
072.	6.74554E-01	1.01434E 00	9.94474E-03	-3.16235E-04	-6.29454E-04	2.27903E-05
073.	6.29740E-01	1.01401E 00	1.43334E-03	-1.32585E-05	-2.39774E-04	1.33682E-06
074.	6.15000E-01	1.01400E 00	5.91311E-09	-3.41624E-07	-2.21072E-04	4.75530E-08
075.	5.96181E-01	1.01400E 00	-1.68854E-03	-3.41624E-07	-2.21072E-04	4.75530E-08
076.	1.18947E 00	1.04956E 00	1.18691E 00	-1.31938E-03	-3.99746E-04	1.15701E-03
077.	1.15926E 00	1.06010E 00	1.17166E 00	-1.29455E-03	-6.3E-04	1.22671E-03
079.	1.11953E 00	1.05643E 00	1.15064E 00	-1.44604E-03	-1.355E-03	1.35005E-03
080.	8.99539E-01	9.19747E-01	9.83933E-01	-1.34501E-03	-2.16836E-03	1.60460E-03
082.	8.70547E-01	9.08025E-01	9.68663E-01	-1.33663E-03	-2.37954E-03	1.59048E-03
083.	4.54984E-01	8.44356E-01	8.66331E-01	-1.48714E-03	-2.18731E-03	9.88368E-04
085.	3.84335E-01	8.92383E-01	8.27513E-01	-1.54476E-03	-1.76187E-03	4.38397E-04
086.	3.71117E-01	9.96886E-01	7.61632E-01	-1.49504E-03	-1.42292E-03	2.43460E-04
088.	3.69262E-01	1.01693E 00	7.41601E-01	-1.20694E-03	-1.32340E-03	1.56476E-04
090.	3.67268E-01	1.02727E 00	7.15300E-01	-8.63335E-04	-1.12871E-03	1.10786E-04
092.	3.63601E-01	1.02751E 00	6.88629E-01	-5.14636E-04	-8.34361E-04	1.62489E-05
093.	3.33892E-01	1.01513E 00	5.86871E-01	-1.15831E-04	-2.87675E-04	1.18297E-05
094.	3.14811E-01	1.01402E 00	5.46095E-01	-5.18813E-06	-1.08857E-04	6.86895E-07
095.	3.08000E-01	1.01400E 00	5.33000E-01	-1.67462E-07	-1.00359E-04	3.72184E-08
096.	2.99254E-01	1.01400E 00	5.16321E-01	-1.67462E-07	-1.00359E-04	3.72184E-08

MAXIMUM DISPLACEMENT: 1.31116E 00, OCCURED AT JOINT, 036.
 MAXIMUM ROTATION: 4.25289E-03, OCCURED AT JOINT, 062.

TABLE E1 LIST OF GLOBAL COORDINATES BY NODE

JOINT IDEN.	STRESS FLAG	GLOBAL -- COORDINATES		
		X	Y	Z
001.	S	110.24	348.82	-640.18
002.	S	110.24	348.82	-702.60
003.	S	110.24	348.82	-698.27
004.	S	110.24	348.82	-550.28
005.	S	110.24	348.82	-536.22
006.	S	110.24	348.82	-507.72
007.	S	110.24	364.17	-507.72
008.	S	110.24	348.82	-479.21
009.	S	110.24	348.82	-461.65
010.	S	110.24	348.82	-443.78
011.	S	110.24	348.82	-415.28
012.	S	110.24	378.90	-415.28
013.	S	110.24	348.82	-386.77
014.	S	110.24	348.82	-364.23
015.	S	110.24	348.82	-325.38
016.	S	133.58	348.82	-228.70
017.	S	315.39	348.82	-207.86
018.	S	354.61	348.82	-169.01
019.	S	377.95	348.82	-129.92
020.	S	377.95	348.82	-98.43
021.	S	377.95	348.82	-37.80
022.	S	377.95	348.82	0.
023.	S	377.95	348.82	78.74
024.	S	377.95	348.82	98.43
025.	S	377.95	348.82	129.92
026.	S	377.95	348.82	153.54
027.	S	377.95	348.82	171.26
028.	S	363.39	363.38	-129.92
029.	S	355.12	371.66	-129.92
030.	S	341.81	377.17	-129.92
031.	S	252.45	377.17	-129.92
032.	S	243.05	377.17	-132.44
033.	S	134.40	377.17	-195.17
034.	S	118.11	395.97	-204.57
035.	S	118.11	438.41	-204.57
036.	S	116.85	447.81	-202.39
037.	S	113.41	454.70	-196.43
038.	S	108.70	457.22	-188.28
039.	S	87.81	457.22	-152.10
040.	S	78.71	457.22	-136.33
041.	S	75.67	457.22	-131.06
042.	S	71.85	457.22	-124.45
043.	S	363.39	363.38	0.
044.	S	355.12	371.66	0.

TABLE E1 CONTINUED

JOINT IDEN.	STRESS FLAG	GLOBAL -- COORDINATES		
		X	Y	Z
061.	S	341.81	377.17	0.
062.	S	255.03	377.17	0.
064.	S	236.22	395.97	0.
065.	S	236.22	438.41	0.
067.	S	233.70	447.81	0.
069.	S	226.82	454.70	0.
071.	S	217.41	457.22	0.
072.	S	175.63	457.22	0.
073.	S	157.42	457.22	0.
074.	S	151.34	457.22	0.
075.	S	143.70	457.22	0.
076.	S	363.39	363.38	129.92
077.	S	355.12	371.66	129.92
079.	S	341.81	377.17	129.92
080.	S	252.45	377.17	132.44
082.	S	277.05	377.17	195.17
083.	S	134.40	377.17	204.57
085.	S	11.11	395.97	204.57
086.	S	11.11	438.41	202.39
088.	S	11.11	447.81	196.43
090.	S	11.11	454.70	189.28
092.	S	108.70	457.22	152.10
093.	S	87.81	457.22	136.33
094.	S	78.71	457.22	131.06
095.	S	75.67	457.22	124.45
096.	S	71.85	457.22	-640.18
ANC X		111.24	348.82	-640.18
ANC Y		110.24	349.82	-639.18
ANC Z		110.24	348.82	-131.06
RPVN1X		76.67	457.22	-131.06
RPVN1Y		75.67	458.22	-131.06
RPVN1Z		75.67	457.22	-130.06
RPVN2X		152.34	457.22	0
RPVN2Y		151.34	458.22	0
RPVN2Z		151.4	457.22	1.70
RPVN3X		76.67	457.22	131.06
RPVN3Y		75.67	458.22	131.06
RPVN3Z		75.67	457.22	132.06
GUIDEX		111.24	348.82	-461.65
GUIDEY		110.24	349.82	-461.65
AH008		377.95	349.82	-37.80

FIGURE E2 ABWR FEEDWATER LOOP A
STRESS ISOMETRIC (NODE) DIAGRAM

